MAIN MEMORY TEST

This program tests the ability of the Main Memory section to accept and retain various bit configurations. This is accomplished by loading and evaluating a series of patterns which range in complexity from the simplest to two patterns generating the maximum amount of noise in the core sense windings. These patterns include a worst pattern, a random number generator, a read/write test and pattern test consisting of hold 1's, hold 0's, alternate 1's and 0's and alternate 0's and 1's. Each pattern is loaded and evaluated within a subroutine which is under the control of an executive routine. In addition, an addressing structure test is included which is also under control of the executive.

The entire main memory is tested as follows: The program is loaded into back 0 and tests bank 1. Then the program transfers the entire contents of bank 0 to bank 1 and tests the next allowed bank, etc. When the program has completed testing the highest numbered bank in the computer, it transfers itself and the contents of the bank it is in, to that bank and tests bank 0. Then the program transfers itself and the contents of the bank it is in to bank 0 and the cycle is repeated. This program is written for an 1219. The following Computer Size table shows the appropriate indices that must be entered into AU and AL before the program is initiated.

COMPUTER SIZE TABLE

Main Memory Size	Set AU to:	Control Memory Size	Set AL bits 2-0 to:
8192	000000	128	0
16384	000001	256	1
24576	000002		
32768	000003		
40960	000004		
49152	000005		
57344	000006		
65536	000007		

The operator has the option of selecting either or both a computer console error display or an error typeout. If PROGRAM STOP 0 is set and an error is detected, the test will stop and display the correct pattern in AU and the incorrect pattern in AL. Upon restarting, the test will stop with the failing address in AL. If PROGRAM SKIP 4 is not set Typeout Subroutines will provide the operator with a typeout of the status of the Main Memory Test. If an error is detected and PROGRAM SKIP 4 is not set, the failing address and the correct and incorrect patterns will be buffered out.

The Main Memory Test may be run separately or as part of the Integrated Memory Test. If it is run separately PROGRAM SKIP 2 must be set to remain in the MAIN MEMORY TEST. The following is the operating procedure for the MAIN MEMORY TEST:

a. Disconnect the RTC.

b. Load the MAIN MEMORY TEST PROGRAM. The jumps and stops for this program are as specified in the following table:

PROGRAM SWITCH	PROGRAM ACTION
PROGRAM SKIP 0	Set to recycle a continuously failing test subroutine (See note)
PROGRAM SKIP 1	Set to retest the current bank
PROGRAM SKIP 2	Set to remain in the Main Memory Test
PROGRAM SKIP 4	Set to supress typeouts
PROGRAM STOP 0	Set for computer console error display
PROGRAM STOP 1	Set to end test in current bank
PROGRAM STOP 2	Set to stop after error typeout
PROGRAM STOP 3	Set to stop after a selected number of complete cycles of the Main Memory Test are completed. (The number -1 in address NUMB) This stop is used with typeouts only.

NOTE: This skip, PROGRAM SKIP 0, will result in recycling only if the test fails each time it is run. Therefore use PROGRAM SKIP 1 when using PROGRAM SKIP 0.

c. Set PROGRAM SKIPS and STOPS as desired according to the above table.

d. Master Clear and Computer.

e. Set AU and AL Bits 2-0 to the appropriate size indices as found in the Computer Size Table.

f. Set the 1232/1532 channel number in AL bits 6 to 3.

g. Set AL bit 8 if the I/O Console is a 1532.

h. Set AL bits 17-15 as follows:

Set bit 17 if computer is in 1218 normal mode.
Set bit 16 if computer is in 1218 NTDS mode.
Set bit 15 if computer is in 1219 normal mode.

i. Insert (if necessary) the plug-in printed wiring assembly 7104010 in the location specified as follows:

A4A1J5G if computer is in 1218 normal mode.
A4A1J5F if computer is in 1218 NTDS mode.
A4A1J4G if computer is in 1219 normal mode.

j. Set P = 03700.

k. Start the Computer.

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 769 | REVISION 1

SPECIFICATION SYMBOL
SB-10163

TITLE: CRANK.- 1219 MAIN MEMORY TEST INITIALIZATION AND MONITOR

DECK IDENTIFIER: FACT

CS-1 LABEL: CRANK KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 85

DESCRIPTION:
This routine, CRANK, initializes and monitors the 1219 Main Memory test.

CRANK is one of a series of routines comprising the 1219 Main Memory test. The Main Memory test, tests all memory except wired and control memory, by loading and verifying the following patterns: all zeroes, all ones, alternating ones and zeros, alternating zeroes and ones, worst pattern, complement worst pattern, and random word pattern.

Before CRANK is initiated AU and AL are manually set to appropriate indices for control and main memory size. Upon initiation, the program uses these indices to set memory size parameters. Then the program size is calculated and stored as a reference for the program transfer routine, RSET. PROGRAM SKIP 4 is referenced. If set, routine TESTS is entered. If not set, MEMORY TEST is printed. The number of cycles completed by the Main Memory test is referenced. If 10 cycles are not completed the Main Memory test is cycled again. If 10 cycles are completed a flag is checked to determine if any errors occurred during the test. If no errors occurred, END 10 CYCLES, is printed. Then PROGRAM STOP 3 is referenced for the end of the Main Memory test.
If PROGRAM STOP 3 is not set, PROGRAM SKIP 2 is referenced. If not set an exit to the Integrated Test Executive will be made. If set the Memory Test is continued. If errors occurred during the 10 cycle run RECYCLE is printed and PROGRAM SKIP 2 is referenced as explained above.

Routine CRANK is entered at address TRACK from routine RSET after the memory test program is running.

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SPECIFICATION SHEET

PROGRAM DATA PAGE (Cont)

SHEET 770	REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: CRANK - 1219 B MAIN MEMORY TEST INITIALIZATION AND MONITOR

INPUT PARAMETERS (Listed Sequentially):

AU and AL entered manually
JVW
JVW1
BAER
BANK1

OUTPUT PARAMETERS (Listed Sequentially):

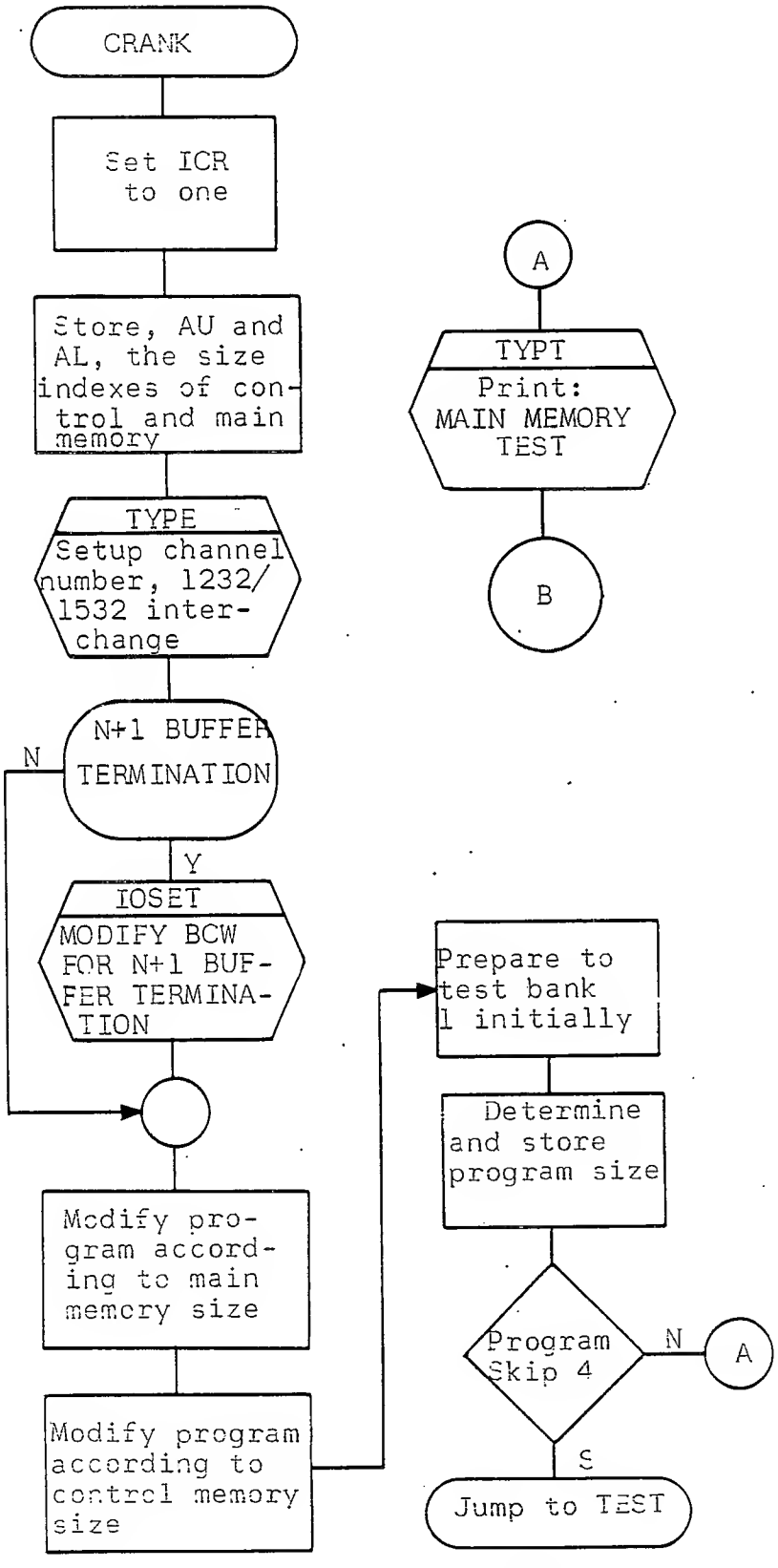
WIRE3	Buffer PC	
BLMN	Buffer MEM-MEMO+3	BAER
PAR		
RWEX3	Buffer END-END+5	
PAR1		
TOTAL	Buffer BUN-BUN+3	

ABNORMAL EXITS (Listed Sequentially):

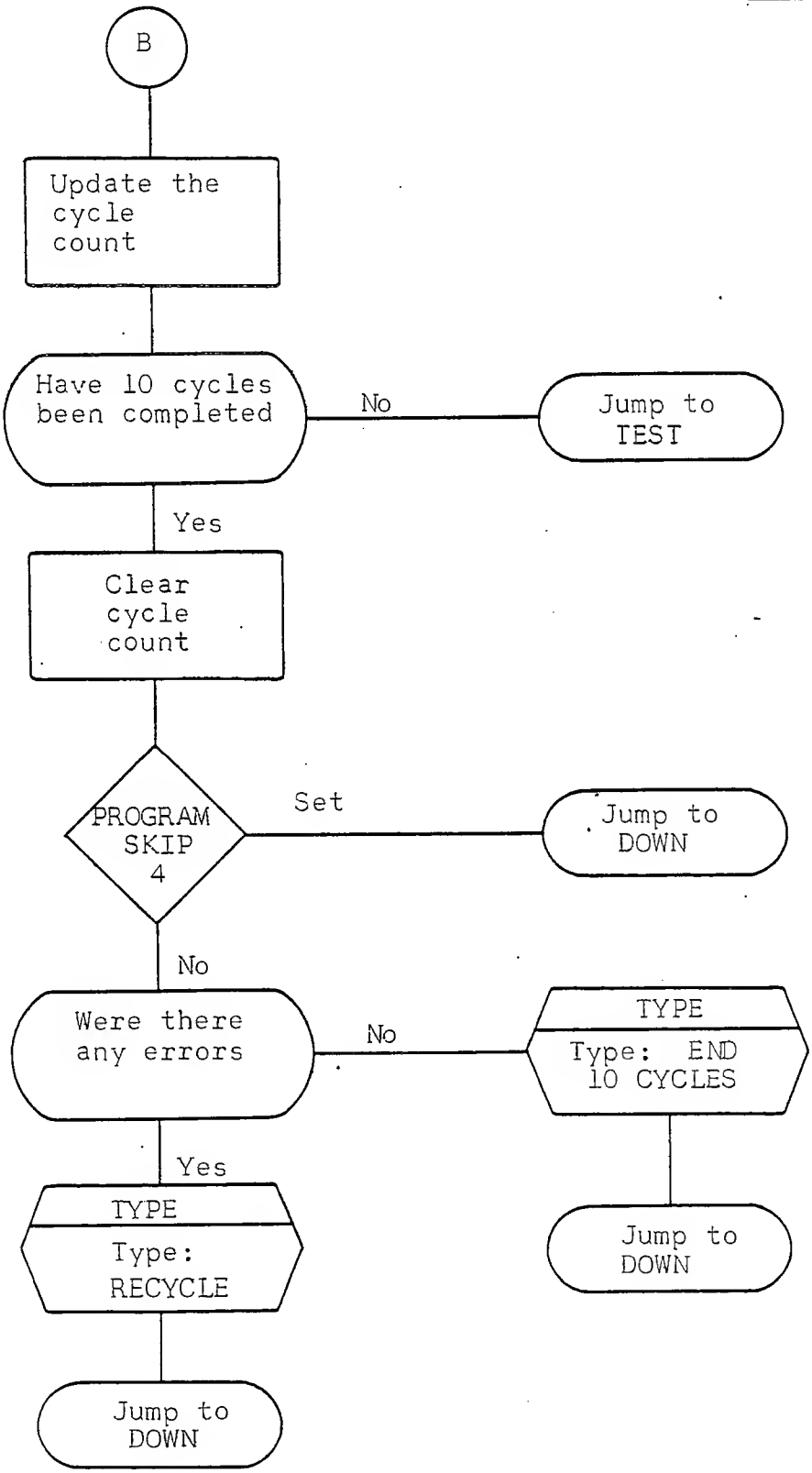
NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

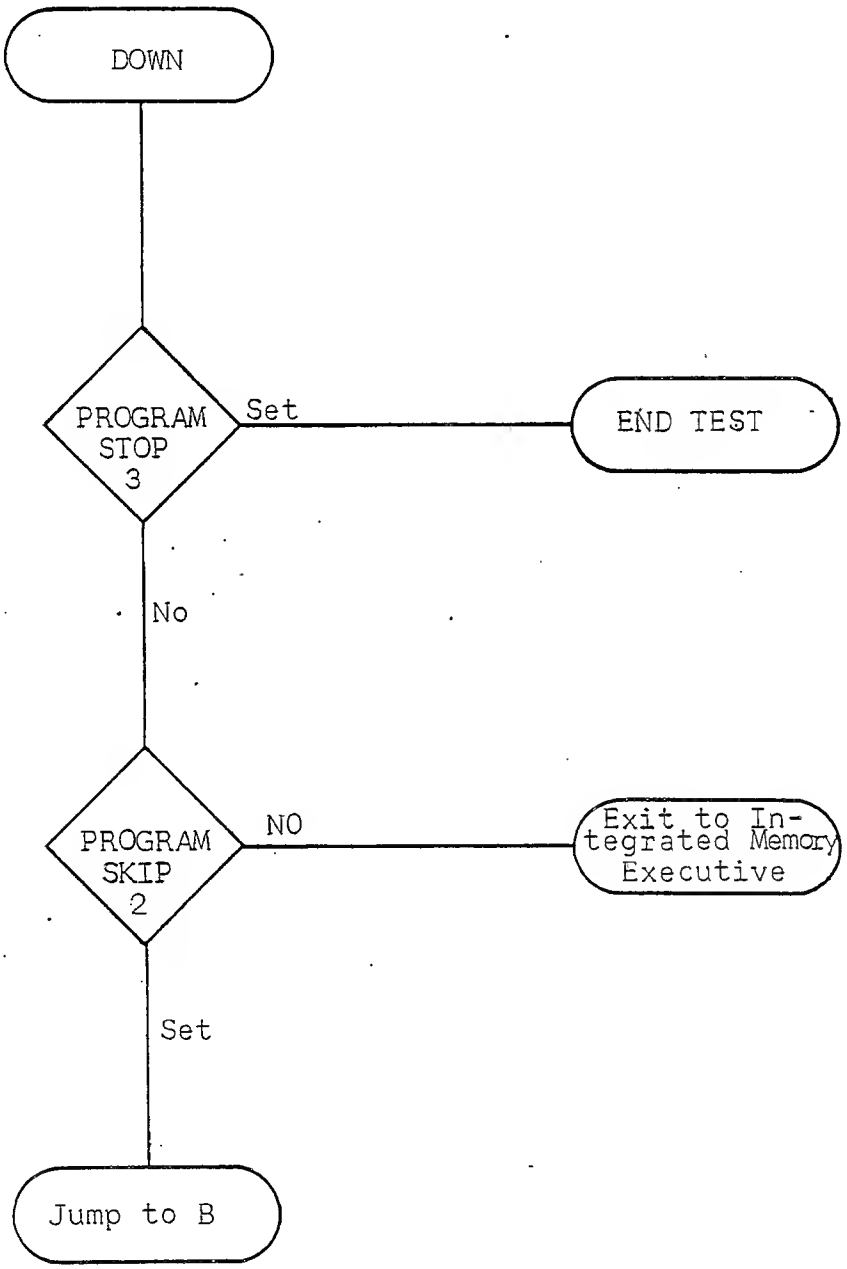
SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:


CRANK
Set ICR to one
Store, AU and AL, the size indexes of control and main memory
TYPE
Setup channel number, 1232/1532 interchange
N+1 BUFFER TERMINATION
N
Y
IOSET
MODIFY BCW FOR N+1 BUFFER TERMINATION
Modify program according to main memory size
Modify program according to control memory size
A
TYPT
Print: MAIN MEMORY TEST
B
Prepare to test bank 1 initially
Determine and store program size
Program Skip 4
N
A
S
Jump to TEST

CRANK


B
Update the cycle count
Have 10 cycles been completed
No
Jump to TEST
Yes
Clear cycle count
PROGRAM SKIP 4
Set
Jump to DOWN
No
Were there any errors
No
TYPE
Type: END 10 CYCLES
Jump to DOWN
Yes
TYPE
Type: RECYCLE
Jump to DOWN


DOWN
PROGRAM STOP 3
Set
END TEST
No
PROGRAM SKIP 2
NO
Exit to Integrated Memory Executive
Set
Jump to B

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 774 | REVISION —

SPECIFICATION SYMBOL SB-10163

TITLE: ERROUT - ERROR TYPEOUT

DECK IDENTIFIER: FACT

CS-1 LABEL: ERROUT KEY: IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 Dec 67

NUMBER OF L2 OUTPUT INSTRUCTIONS: 59

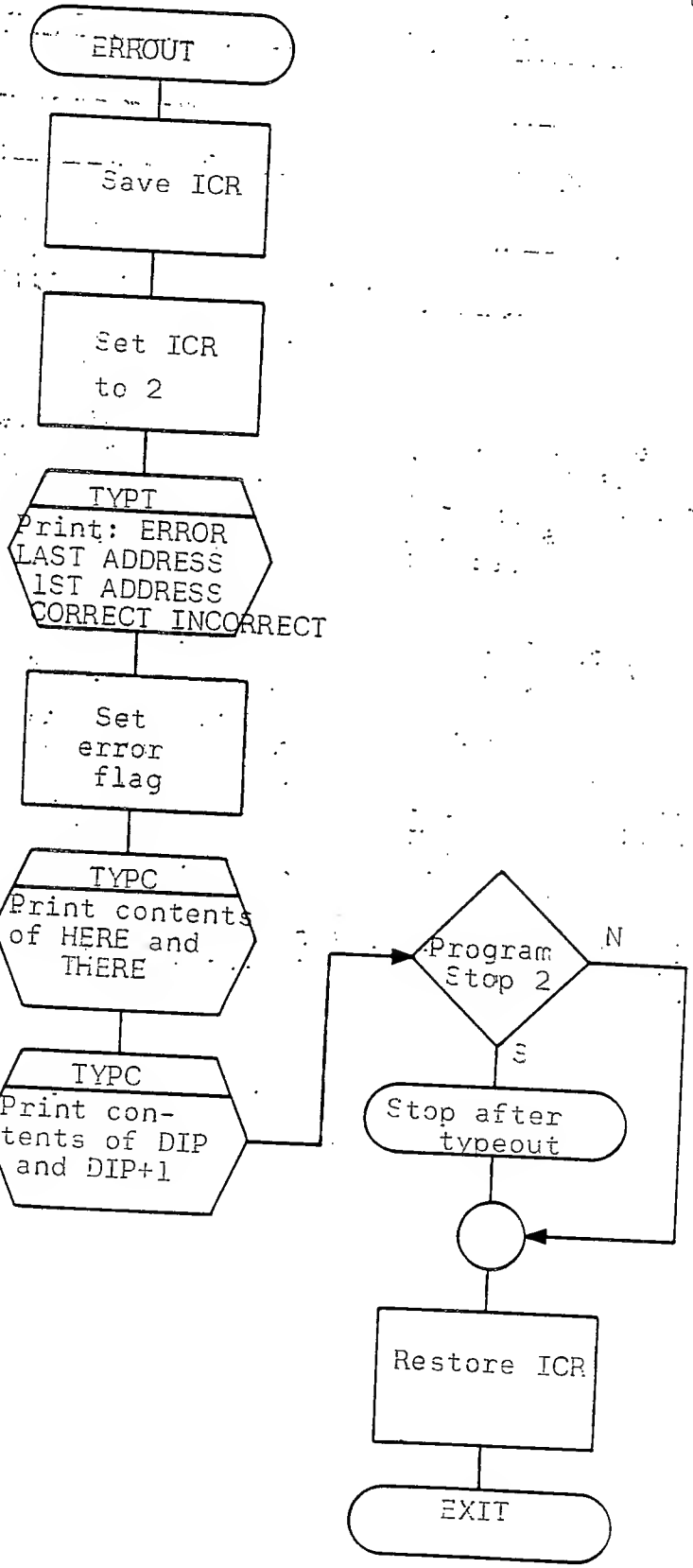
DESCRIPTION:

This subroutine, ERROUT, types out the following error indication:

ERROR 1st ADDRESS	LAST ADDRESS	CORRECT	INCORRECT
XXXXXX	XXXXXX	XXXXXX	XXXXXX

After the typeout PROGRAM STOP 2 is referenced for the end of the Main Memory test. This routine, ERROUT, is referenced by the following routines: PROOF, WP1, CWP1 and RW.

Upon entering ERROUT the current ICR is stored and reset to 2. An error flag is set. The typeout is done in the format shown above and PROGRAM STOP 2 is referenced for end of test. The ICR is restored to its original value and an exit from ERROUT is made.


ERROUT
Save ICR
Set ICR to 2
TYPT
Print: ERROR
LAST ADDRESS
1ST ADDRESS
CORRECT INCORRECT
Set error flag
TYPC
Print contents of HERE and THERE
TYPC
Print contents of DIP and DIP+1
Program Stop 2
N
Y
Stop after typeout
Restore ICR
EXIT

ERROUT

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 777 | REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: WIRE - CHECK FOR WIRED AND CONTROL MEMORY

DECK IDENTIFIER: FACT

CS-1 LABEL: WIRE KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 Dec 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 27

DESCRIPTION:

This subroutine, WIRE, checks the address of the memory location, in Bank 0, about to be loaded or verified to determine if it is in either control or wired memory. If it is in either, this routine makes appropriate modifications. If any bank other than zero is being tested control is promptly returned to the routine referencing WIRE.

This subroutine, WIRE, is referenced by the following routines: TEST, PROOF, HD1, HALT, HALT0, WP1, CWP1, RW1 and FLUSH1.

When WIRE is entered the value of the current index register is stored because its value equals the address about to be loaded or verified. Then the following checks are made on B, the value of the current index register. If $B \geq 700_8$ an exit is made from WIRE. If $B = 200_8$ it is set to 300_8 and an exit is made from WIRE. If $B = 500_8$ it is set to 540_8 and an exit is made from WIRE. If the control memory includes 256 addresses and $B = 400_8$ it is set to 540_8 and an exit is made from WIRE. If $B = 600_8$ it is set to 700_8 and an exit is made from WIRE.

TITLE: WIRE - CHECK FOR WIRED AND CONTROL MEMORY

INPUT PARAMETERS (Listed Sequentially):

The value of the current index register

WIRE3

OUTPUT PARAMETERS (Listed Sequentially):

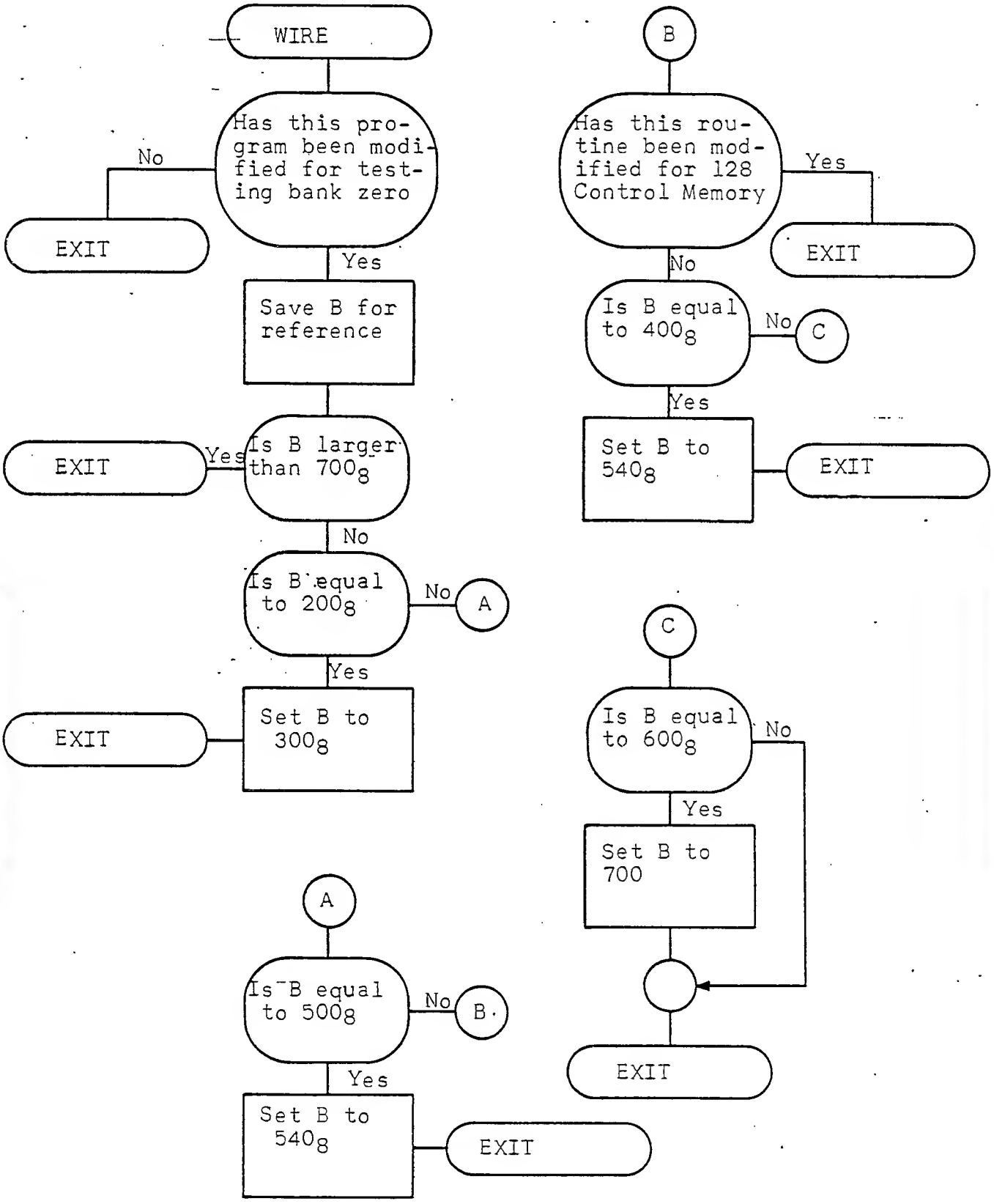
The modified or unmodified value of the current index register

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:


WIRE
Has this program been modified for testing bank zero
No
EXIT
Yes
Save B for reference
Is B larger than 700₈
Yes
EXIT
No
Is B equal to 200₈
No
A
Yes
Set B to 300₈
EXIT
A
Is B equal to 500₈
No
B
Yes
Set B to 540₈
EXIT
B
Has this routine been modified for 128 Control Memory
Yes
EXIT
No
Is B equal to 400₈
No
C
Yes
Set B to 540₈
EXIT
C
Is B equal to 600₈
No
Yes
Set B to 700
EXIT

WIRE

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 780 | REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: TYPE - SETUP CHANNEL NUMBER, 1232/1532 INTERCHANGE

DECK IDENTIFIER: FACT

CS-1 LABEL: TYPE KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: TLR DATE: 8 December 1967

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 43

DESCRIPTION:

This subroutine inserts the 1232/1532 channel number in all I/O instructions. It also modifies the TYPT and TYPC subroutines so as to accept either 1232 or 1532 coded data.

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SPECIFICATION SHEET

PROGRAM DATA PAGE (Cont)

SHEET 781 | REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: TYPE

INPUT PARAMETERS (Listed Sequentially):

ALPARM - Initial AL input parameter.

OUTPUT PARAMETERS (Listed Sequentially):

T$1 T$$1
T$2 T$$2
T$3 T$$3
T$4 T$$4
} I/O instructions with channel number inserted.

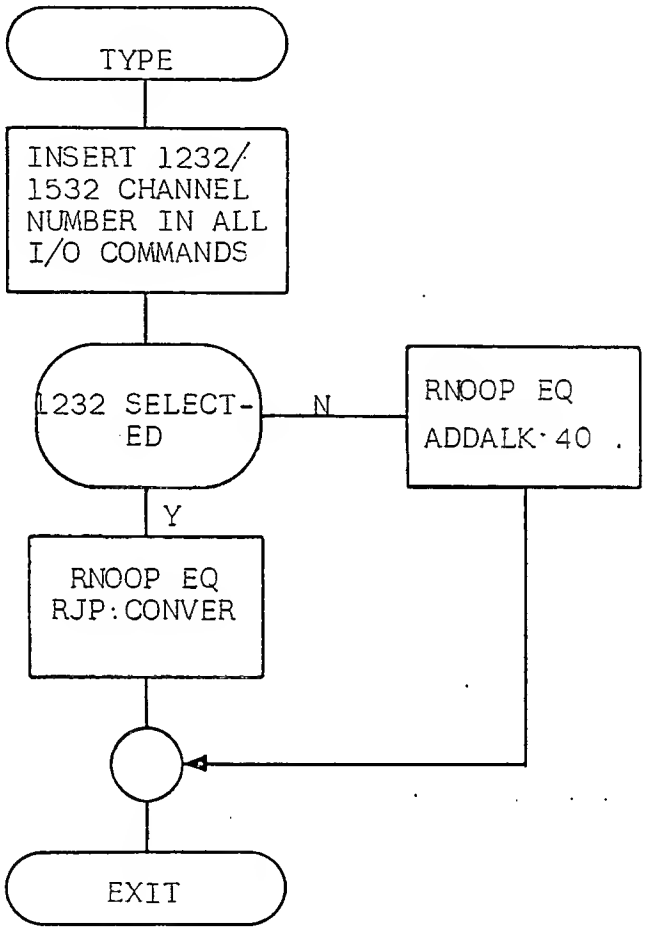
RNOOP { RJP · CONVER if 1232 selected
ADDALK · 40 if 1532 selected

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:


TYPE
INSERT 1232/ 1532 CHANNEL NUMBER IN ALL I/O COMMANDS
1232 SELECT-ED
N
RNOOP EQ ADDALK·40
Y
RNOOP EQ RJP:CONVER
EXIT

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 783 | REVISION

SPECIFICATION SYMBOL
SB-10163

TITLE: IOSET

DECK IDENTIFIER: IOSET

CS-1 LABEL: IOSET KEY: IS LABEL DUPLICATE?

PROGRAMMER: TLR DATE: 8 December 1967

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 14

DESCRIPTION:

This subroutine modifies output and external function buffer for N+1 termination.

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SPECIFICATION SHEET

PROGRAM DATA PAGE (Cont.) | SHEET 784 | REVISION

SPECIFICATION SYMBOL
SB-10163

TITLE: IOSET

INPUT PARAMETERS (Listed Sequentially):

T$1+2
~~T$2+2~~

OUTPUT PARAMETERS (Listed Sequentially):

T$1+1
T$2+1

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

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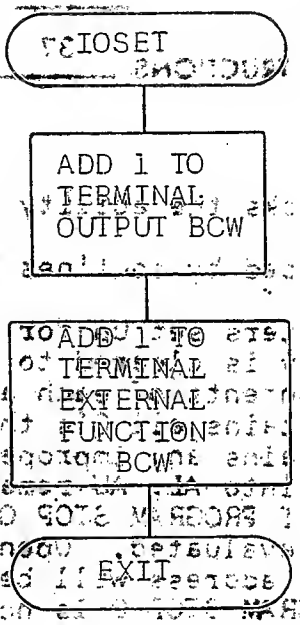
SPECIFICATION SHEET

SHEET 785 | REVISION —

SPECIFICATION SYMBOL SB-10163



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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 786 | REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: TEST - PRINT BANK NUMBER - HOLD ZEROES

DECK IDENTIFIER: FACT

CS-1 LABEL: TEST KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 Dec 6[illegible]

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 37

DESCRIPTION:

This routine, TEST, checks the ability of that bank to hold zeroes.

This routine is referenced by routines CRANK and RSET.

According to the parameters set up for the bank being tested, specified area of memory is cleared to all "0"s. At the completion of the clearing, the contents of each address is entered into AL and checked. If AL contains all 0's the next sequential address is checked. If it contains any improper information the incorrect information is entered into AL, AU remains cleared which is the correct information. If PROGRAM STOP 0 is set the routine stops and the display may be evaluated. Upon restarting with PROGRAM STOP 0 set, the failing address will be displayed in AL and the routine stops. If PROGRAM STOP 0 is not set, or upon restarting, PROGRAM SKIP 4 is referenced. If it is not set an error typeout will occur. After the typeout, or if PROGRAM SKIP 4 is set, PROGRAM SKIP) is checked. If set, the test for holding zeroes will recycle; if not set, the test will continue. Upon successful completion of the test an exit is made to routine HD1.

TITLE: TEST - PRINT BANK NUMBER - HOLD ZEROES

INPUT PARAMETERS (Listed Sequentially):

PAR — TEST PATTERN
PAT 000000

OUTPUT PARAMETERS (Listed Sequentially):

BUFFER BNUM - BNUM+1
DIP
DIP+1
HERE

ABNORMAL EXITS (Listed Sequentially):

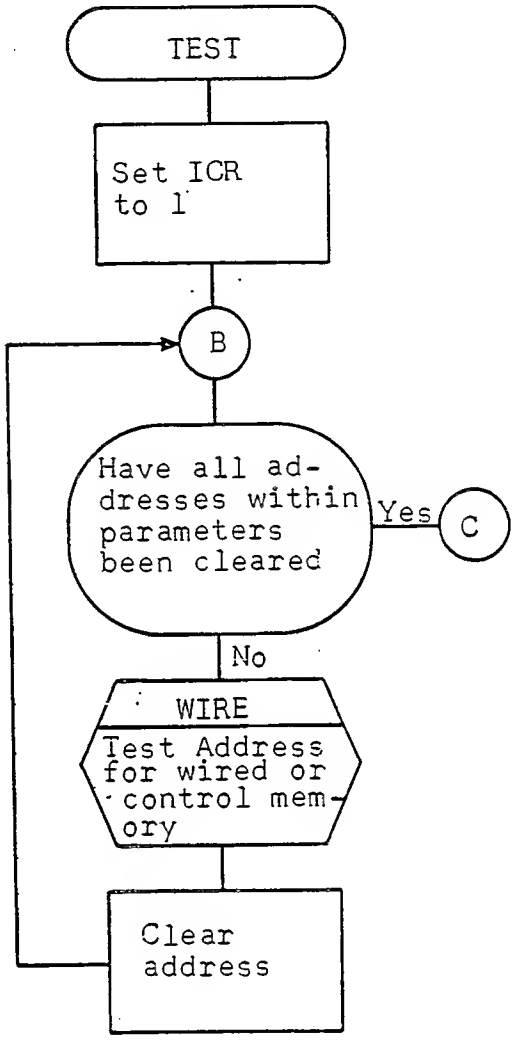
NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

TYPA HD1
DISAL
WIRE
PROOF

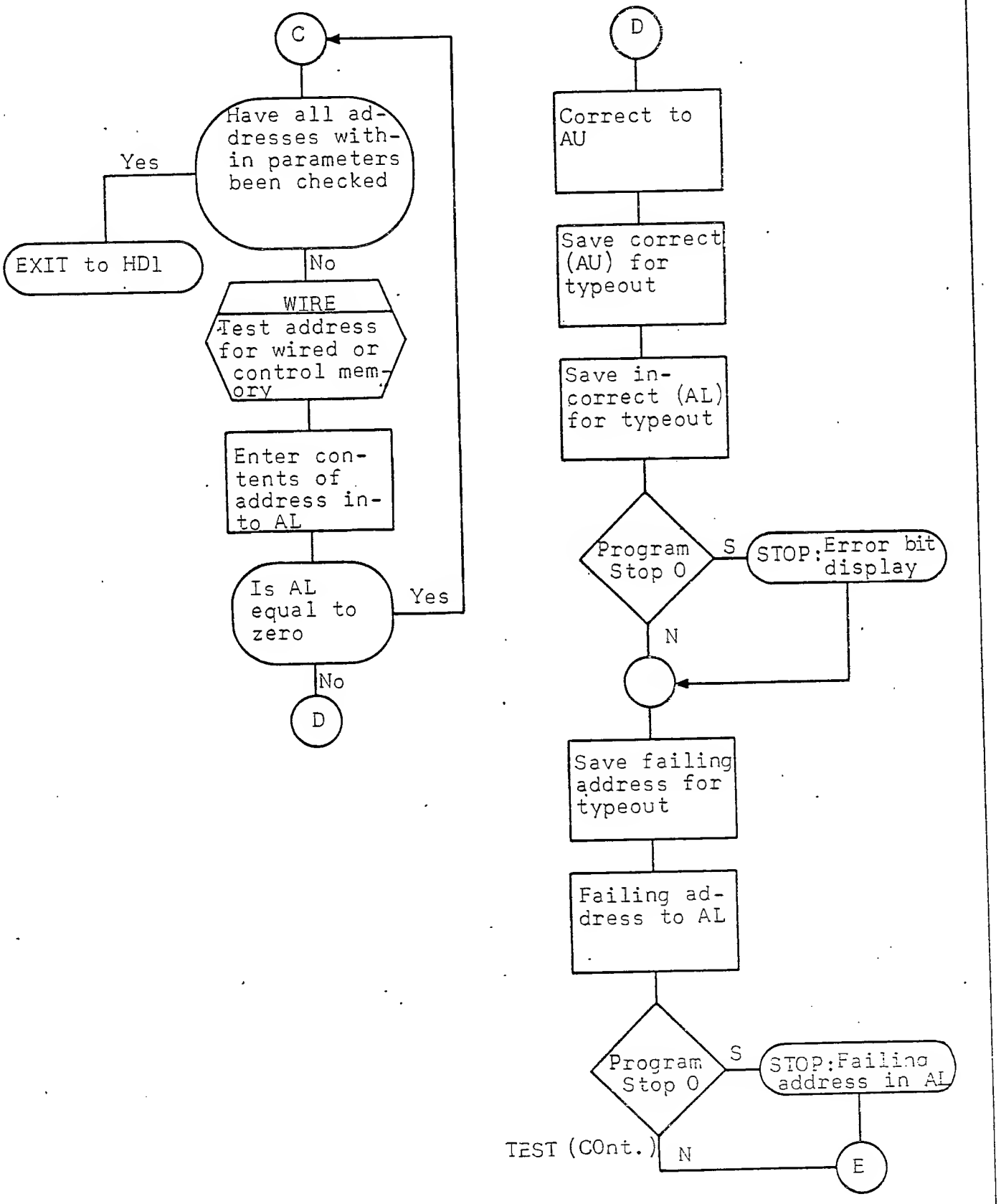
SYSTEM DATA REFERENCES:

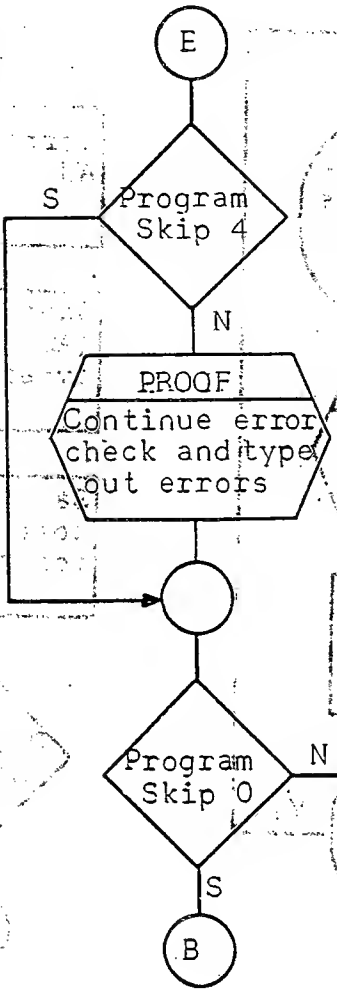
ALARMS AND/OR REMARKS:

ERROR DISPLAYS
1st PROGRAM STOP 0 - correct information in AU (cleared) incorrect information in AL
2nd PROGRAM STOP 0 - failing address displayed in AL
PROGRAM SKIP 4 - not set for error typeout
set to suppress error typeout
PROGRAM SKIP 0 - not set to continue test
set to recycle hold zeroes test


TEST
Set ICR to 1
B
Have all addresses within parameters been cleared
Yes
C
No
WIRE
Test Address for wired or control memory
Clear address

TEST


C
Have all addresses within parameters been checked
Yes
EXIT to HD1
No
WIRE
Test address for wired or control memory
Enter contents of address into AL
Is AL equal to zero
Yes
No
D
D
Correct to AU
Save correct (AU) for typeout
Save incorrect (AL) for typeout
Program Stop 0
S
STOP: Error bit display
N
Save failing address for typeout
Failing address to AL
Program Stop 0
S
STOP: Failing address in AL
TEST (COnt.)
N
E


E
Program Skip 4
S
N
PROOF
Continue error check and type out errors
Program Skip 0
N
C
S
B

TEST (Cont.)

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 791 | REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: PROOF - CONTINUE ERROR CHECK, TYPEOUT

DECK IDENTIFIER:

CS-1 LABEL: PROOF KEY: IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR DATE: 8 Dec 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 14

DESCRIPTION:

This subroutine, PROOF, continues the error check and initiates the error typeout whenever an error typeout is wanted in routines TEST, HD1, HALT and HALTO.

Whenever an error occurs in any of the higher level routines and an error typeout is wanted, this routine, PROOF, continues to check the following addresses for incorrect contents. It then initiates an error typeout indicating the correct and incorrect test pattern and the inclusive consecutive addresses that contain incorrect test patterns. Upon completion of the error typeout, control is returned to the referencing routine.

TITLE: PROOF - CONTINUE ERROR CHECK, TYPEOUT

INPUT PARAMETERS (Listed Sequentially):

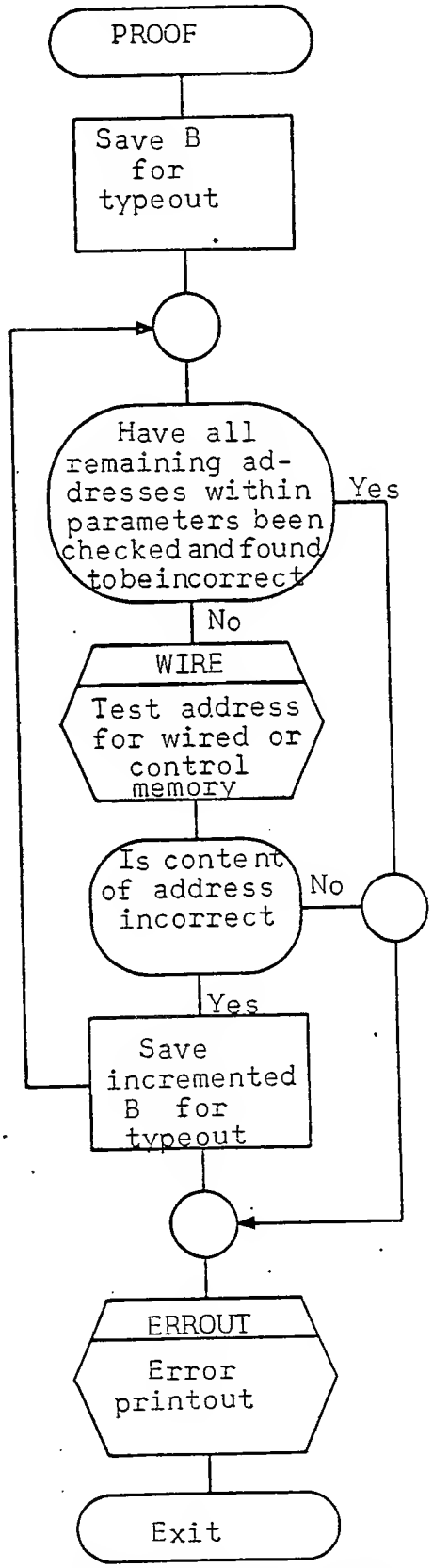
OUTPUT PARAMETERS (Listed Sequentially):
THERE

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
ERROUT
WIRE

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:



PROOF - Continue Error Check, Typeout

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 794 | REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: HD1 - HOLD ONES

DECK IDENTIFIER: FACT

CS-1 LABEL: HD1 KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR DATE: 8 Dec 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 29

DESCRIPTION:

This routine, HD1, checks the ability of the memory banks to receive and retain all ones.

This routine is entered from routine TEST.

According to the parameters set up for the bank being tested a specified area of memory is loaded with all ones (777777). When the load is completed, the contents of each sequential address is entered into AL and checked for validity. If the contents are improper, AU is entered with the correct information (the incorrect being in AL) and PROGRAM STOP 0 is checked. If set, the subroutine stops and the display may be evaluated. Upon restarting, AL is entered with the failing address and, if PROGRAM STOP 0 is still set, the subroutine stops for the address display. If PROGRAM STOP 0 is not set, or upon restarting PROGRAM SKIP 4 is referenced. If it is not set an error typeout will occur. After the typeout, or if PROGRAM SKIP 4 is set, PROGRAM SKIP 0 is checked. If set, HD1 will recycle; if not set, the test will continue. Upon successful completion of HD1 an exit is made to routine HALT.

TITLE: HD1 – HOLD ONES

INPUT PARAMETERS (Listed Sequentially):

PAR		TEST PATTERN
PAR1	PAT1	777777

OUTPUT PARAMETERS (Listed Sequentially):

DIP
DIP+1
HERE

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

WIRE
PROOF
HALT

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

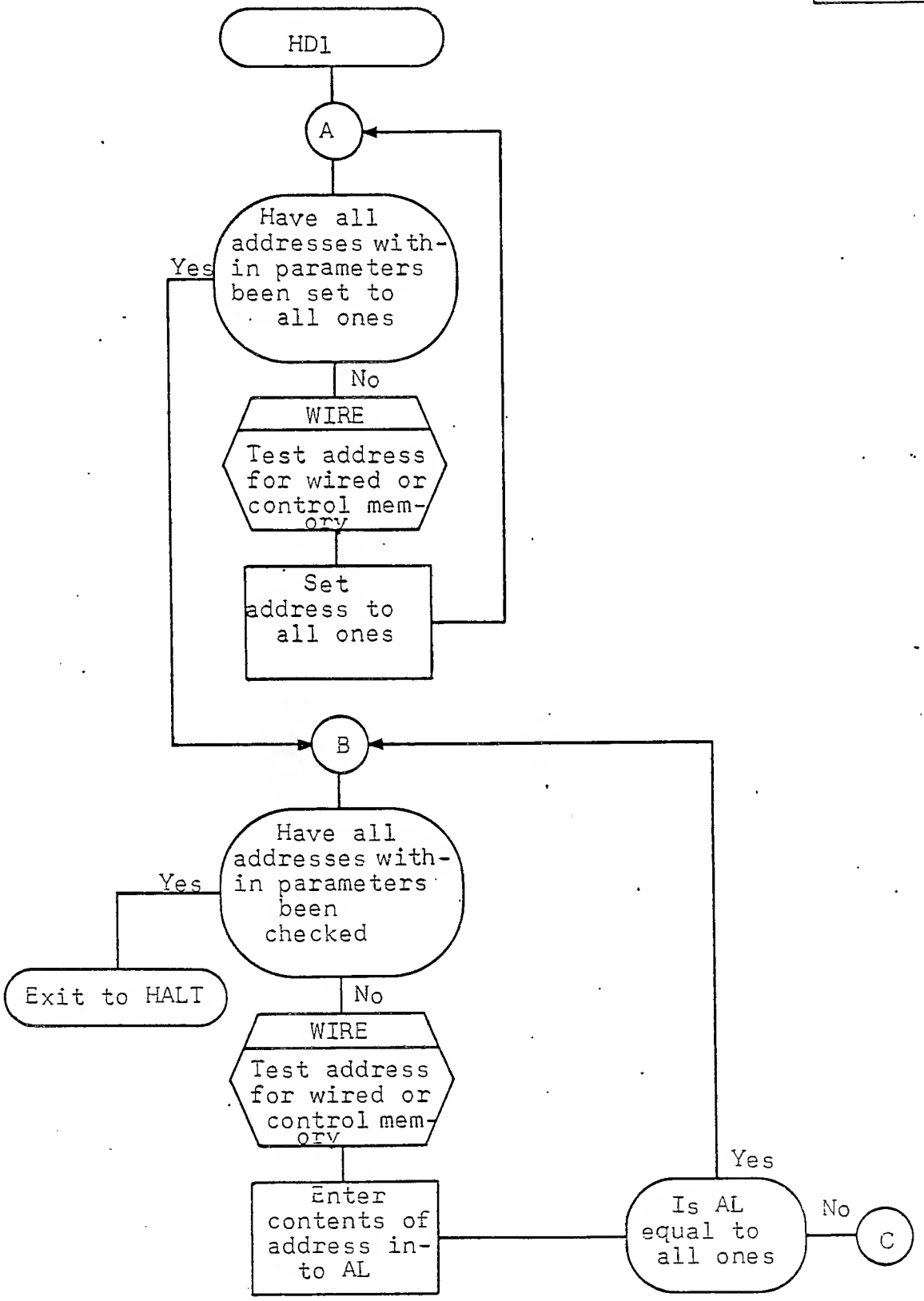
ERROR DISPLAYS

1st PROGRAM STOP 0 - correct information in AU (777777) incorrect information in AL

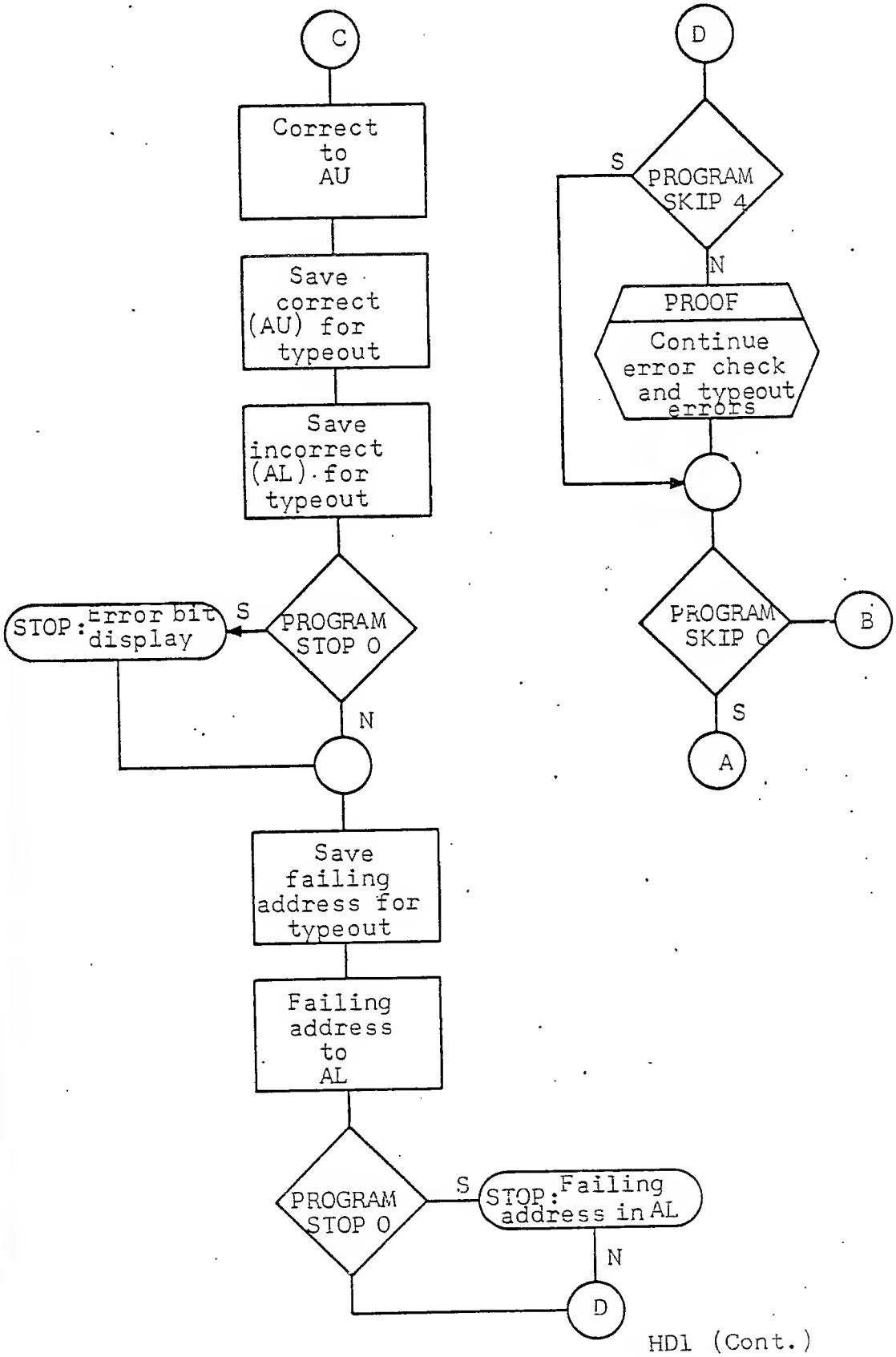
2nd PROGRAM STOP 0 - failing address displayed in AL

PROGRAM SKIP 4 - not set for error typeout
set to suppress error typeout

PROGRAM SKIP 0 - not set to continue routine HD1
set to recycle routine HD1


HD1
A
Have all addresses within parameters been set to all ones
Yes
No
WIRE
Test address for wired or control memory
Set address to all ones
B
Have all addresses within parameters been checked
Yes
Exit to HALT
No
WIRE
Test address for wired or control memory
Enter contents of address into AL
Is AL equal to all ones
Yes
No
C

HD1


C
Correct to AU
Save correct (AU) for typeout
Save incorrect (AL) for typeout
PROGRAM STOP 0
S
STOP: Error bit display
N
Save failing address for typeout
Failing address to AL
PROGRAM STOP 0
S
STOP: Failing address in AL
N
D
D
S
PROGRAM SKIP 4
N
PROOF
Continue error check and typeout errors
PROGRAM SKIP 0
B
S
A

HD1 (Cont.)

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 798 | REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: HALT- HOLD ALTERNATE ONES AND ZEROES

DECK IDENTIFIER: FACT

CS-1 LABEL: HALT KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR DATE: 8 Dec 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 29

DESCRIPTION:

This routine, HALT, checks the ability of the memory banks to receive and retain a pattern of alternate ones and zeroes (525252).

This routine is entered from routine HD1.

According to the parameters set up for the bank being tested a specific area of memory is loaded with alternate ones and zeroes (525252). When the load is completed, the content of each sequential address is entered into AL and checked for validity. If the contents are incorrect, AU is entered with the correct information (the incorrect being in AL) and PROGRAM STOP 0 is checked. If set, the subroutine stops and the display may be evaluated. Upon restarting, AL is entered with the failing address and, if PROGRAM STOP 0 is still set, the subroutine stops for address display. If PROGRAM STOP 0 is not set, or upon restarting, PROGRAM SKIP 4 is referenced. If it is not set an error typeout will occur. After the typeout, or if PROGRAM SKIP 4 is set, PROGRAM SKIP 0 is checked. If set HALT will recycle; if not set, the test will continue. Upon successful completion of HALT, an exit is made to routine HALTO.

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SPECIFICATION SHEET

PROGRAM DATA PAGE (Cont)

SHEET 799 | REVISION —

SPECIFICATION SYMBOL
SE-10163.

TITLE: HALT - HOLD ALTERNATE ONES AND ZEROES

INPUT PARAMETERS (Listed Sequentially):

PAR	TEST PATTERN
PAR1	525252

OUTPUT PARAMETERS (Listed Sequentially):

DIP
DIP+1
HERE

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

WIRE
PROOF
HALTO

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

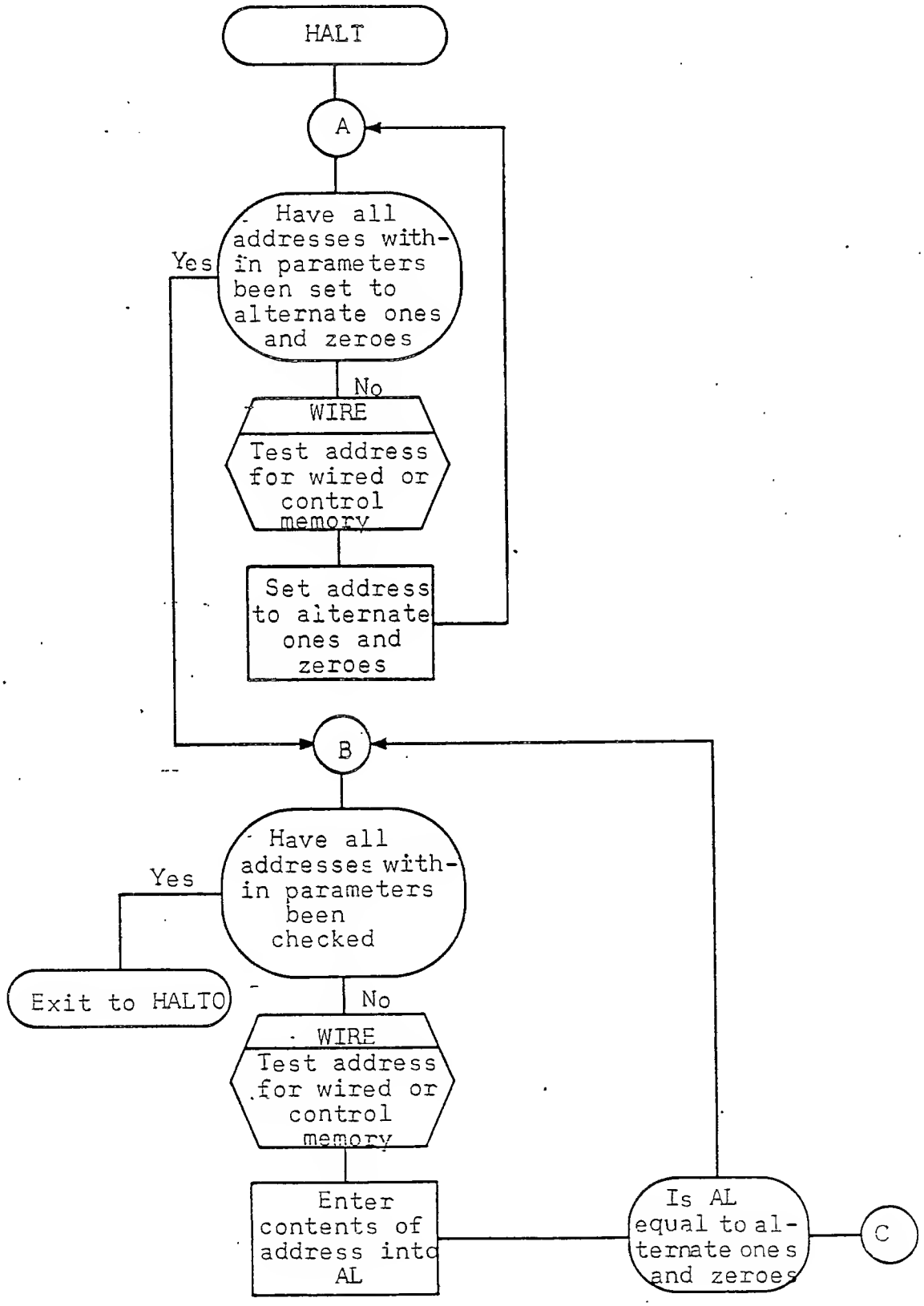
ERROR DISPLAYS

1st PROGRAM STOP 0 - correct information in AU (525252) incorrect information in AL

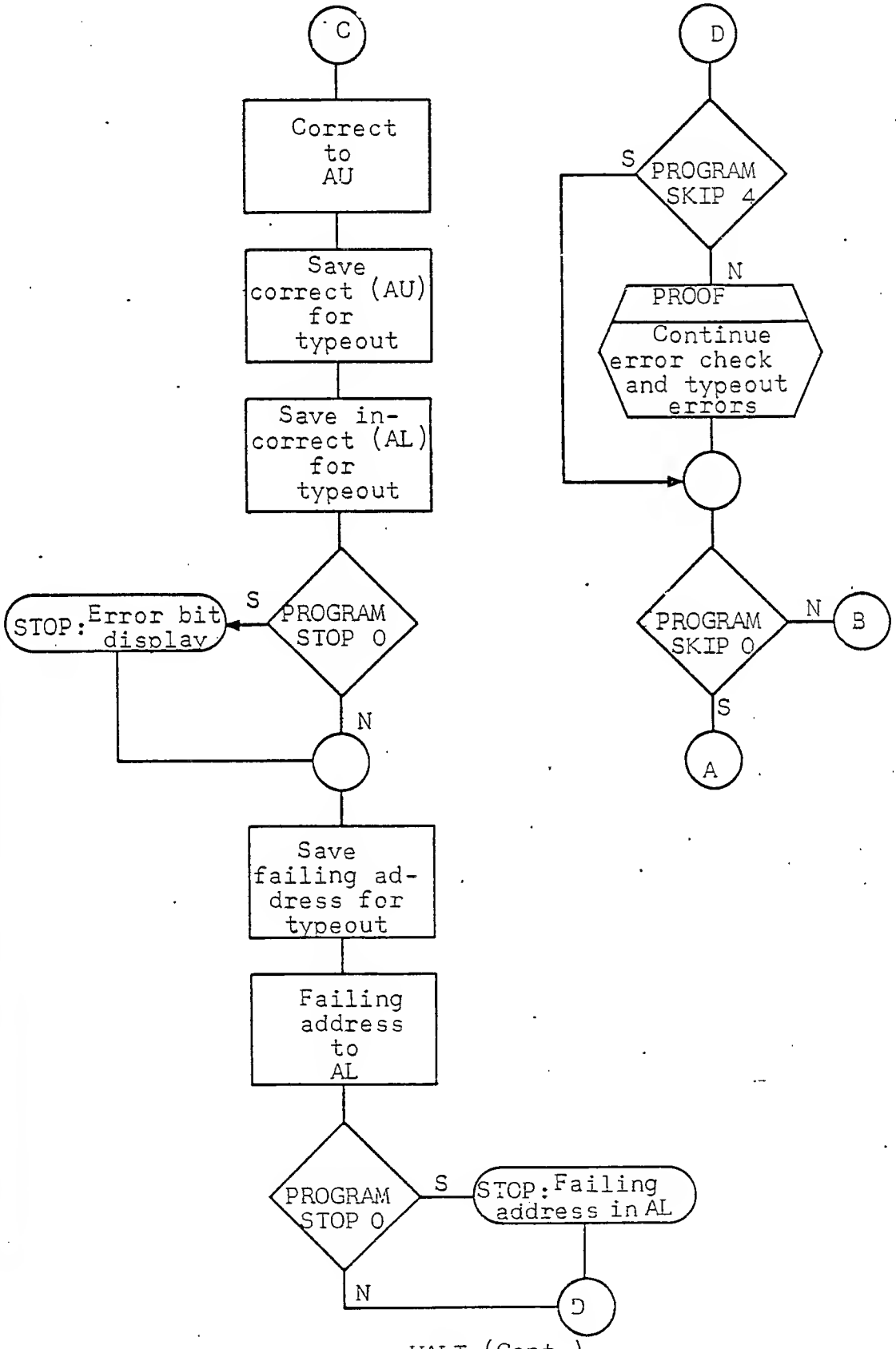
2nd PROGRAM STOP 0 - failing address displayed in AL

PROGRAM SKIP 4 - not set for error typeout
set to suppress error typeout

PROGRAM SKIP 0 - not set to continue routine HALT
set to recycle routine HALT


HALT
A
Have all addresses within parameters been set to alternate ones and zeroes
Yes
No
WIRE
Test address for wired or control memory
Set address to alternate ones and zeroes
B
Have all addresses within parameters been checked
Yes
No
Exit to HALTO
WIRE
Test address for wired or control memory
Enter contents of address into AL
Is AL equal to alternate ones and zeroes
C

HALT


C
Correct to AU
Save correct (AU) for typeout
Save incorrect (AL) for typeout
PROGRAM STOP 0
S
STOP: Error bit display
N
Save failing address for typeout
Failing address to AL
PROGRAM STOP 0
S
STOP: Failing address in AL
N
D
D
PROGRAM SKIP 4
S
N
PROOF
Continue error check and typeout errors
PROGRAM SKIP 0
N
B
S
A

HALT (Cont.)

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 802 | REVISION 1

SPECIFICATION SYMBOL
SB-10163

TITLE: HALTO - HOLD ALTERNATE ZEROES AND ONES

DECK IDENTIFIER: FACT

CS-1 LABEL: HALTO KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR DATE: 5 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 29

DESCRIPTION:

This routine, HALTO, checks the ability of the memory banks to receive and retain a pattern of alternate zeroes and ones (252525).

This routine is entered from routine HALT.

According to the parameters set up for the bank being tested a specific area of memory is loaded with alternate zeroes and ones (252525). When the load is completed, the content of each sequential address is entered into AL and checked for validity. If the contents are incorrect, AU is entered with the correct information (the incorrect being in AL) and PROGRAM STOP 0 is checked. If set, the routine stops and the display may be evaluated. Upon restarting, AL is entered with the failing address and, if PROGRAM STOP 0 is still set, the subroutine stops for address display. If PROGRAM STOP 0 is not set, or upon restarting, PROGRAM SKIP 4 is referenced. If it is not set an error typeout will occur. After the typeout, or if PROGRAM SKIP 4 is set, PROGRAM SKIP 0 is checked. If set, HALT 0 will recycle, if not set, the test will continue. Upon successful completion of HALT 0, an exit is made to routine TWP0.

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SPECIFICATION SHEET

PROGRAM DATA PAGE (Cont)

SHEET 803 | REVISION A

SPECIFICATION SYMBOL
SB-10163

TITLE: HALTO - HOLD ALTERNATE ZEROES AND ONES

INPUT PARAMETERS (Listed Sequentially):

PAR	TEST PATTERN
PAR1	252525

OUTPUT PARAMETERS (Listed Sequentially):

DIP
DIP+1
HERE

ABNORMAL EXITS (Listed Sequentially):

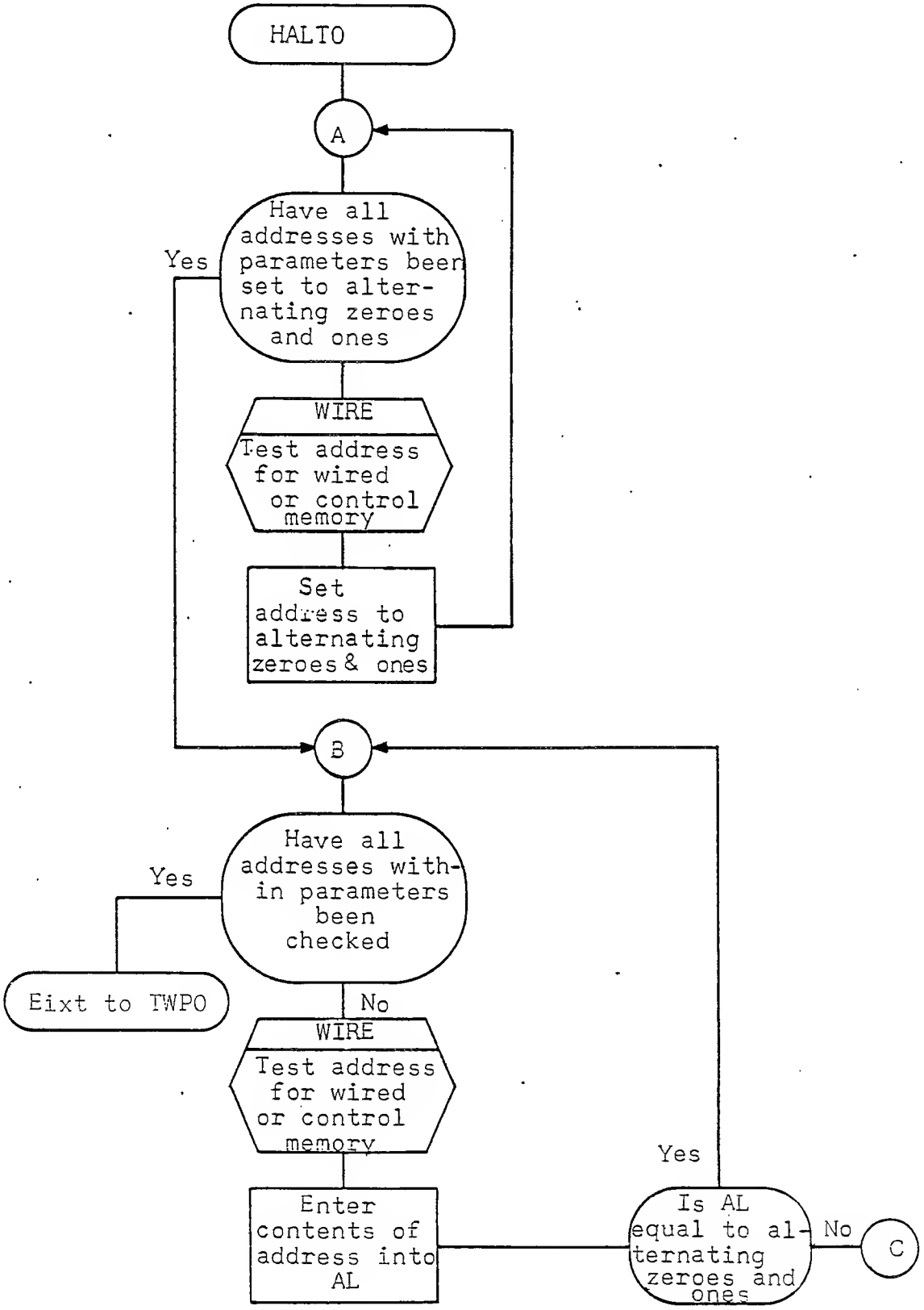
NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

WIRE
PROOF
TWPO

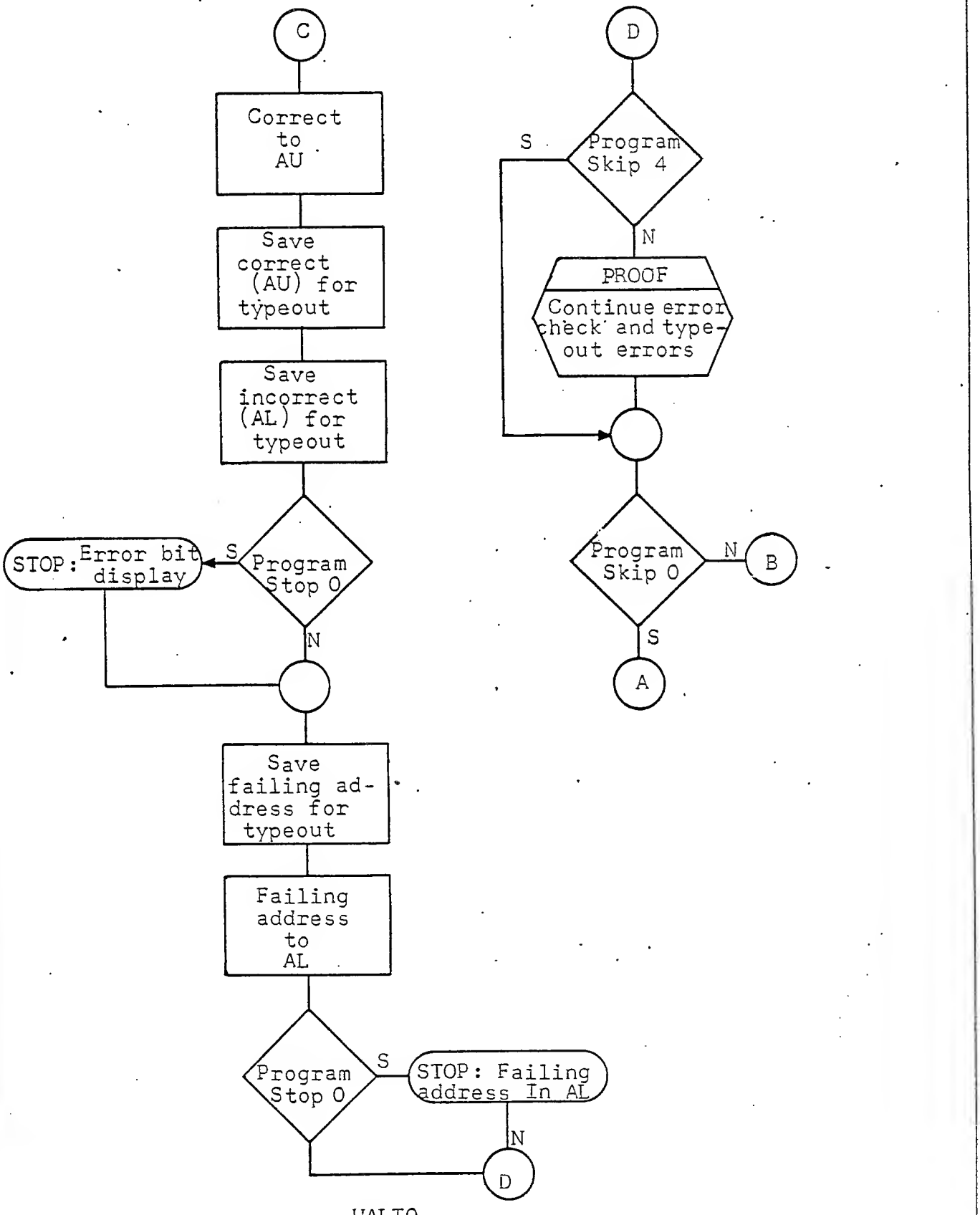
SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAYS
1st PROGRAM STOP 0 - correct information in AU (252525) incorrect information in AL
2nd PROGRAM STOP 0 - failing address displayed in AL
PROGRAM SKIP 4 - not set for error typeout
set to suppress error typeout
PROGRAM SKIP 0 - not set to continue routine HALTO
set to recycle routine HALTO


HALTO
A
Have all addresses with parameters been set to alternating zeroes and ones
Yes
WIRE
Test address for wired or control memory
Set address to alternating zeroes & ones
B
Have all addresses within parameters been checked
Yes
Eixt to TWPO
No
WIRE
Test address for wired or control memory
Enter contents of address into AL
Is AL equal to alternating zeroes and ones
Yes
No
C

HALTO (Cont.)


C
Correct to AU
Save correct (AU) for typeout
Save incorrect (AL) for typeout
Program Stop 0
S
STOP: Error bit display
N
Save failing address for typeout
Failing address to AL
Program Stop 0
S
STOP: Failing address In AL
N
D
D
Program Skip 4
S
N
PROOF
Continue error check and type-out errors
Program Skip 0
N
B
S
A

HALTO

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 806 | REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: TWPO - WORST PATTERN

DECK IDENTIFIER: FACT

CS-1 LABEL: TWPO KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: T. L. R. DATE: 8 Dec 67

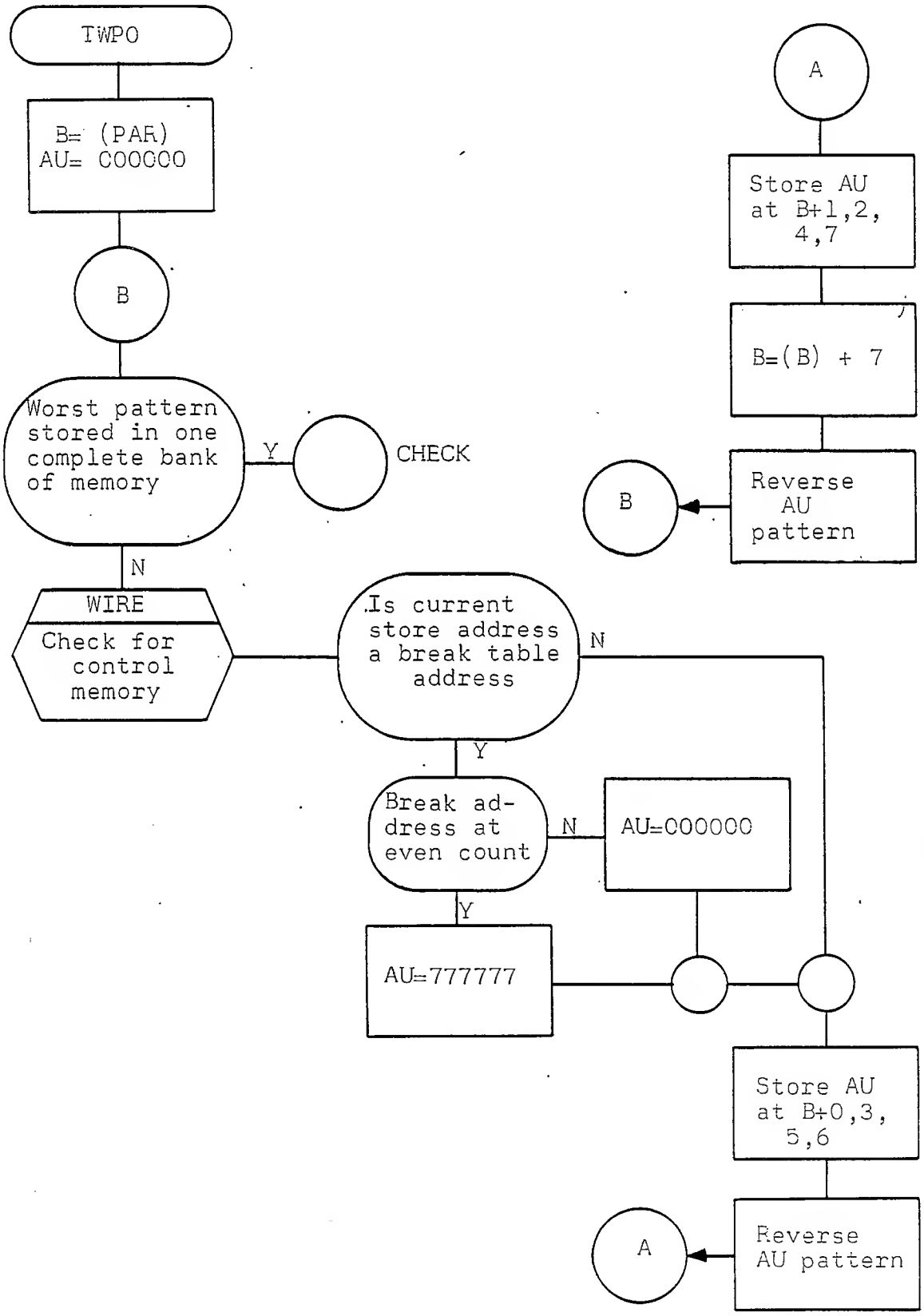
NUMBER OF L_4 OUTPUT INSTRUCTIONS: 159

DESCRIPTION:

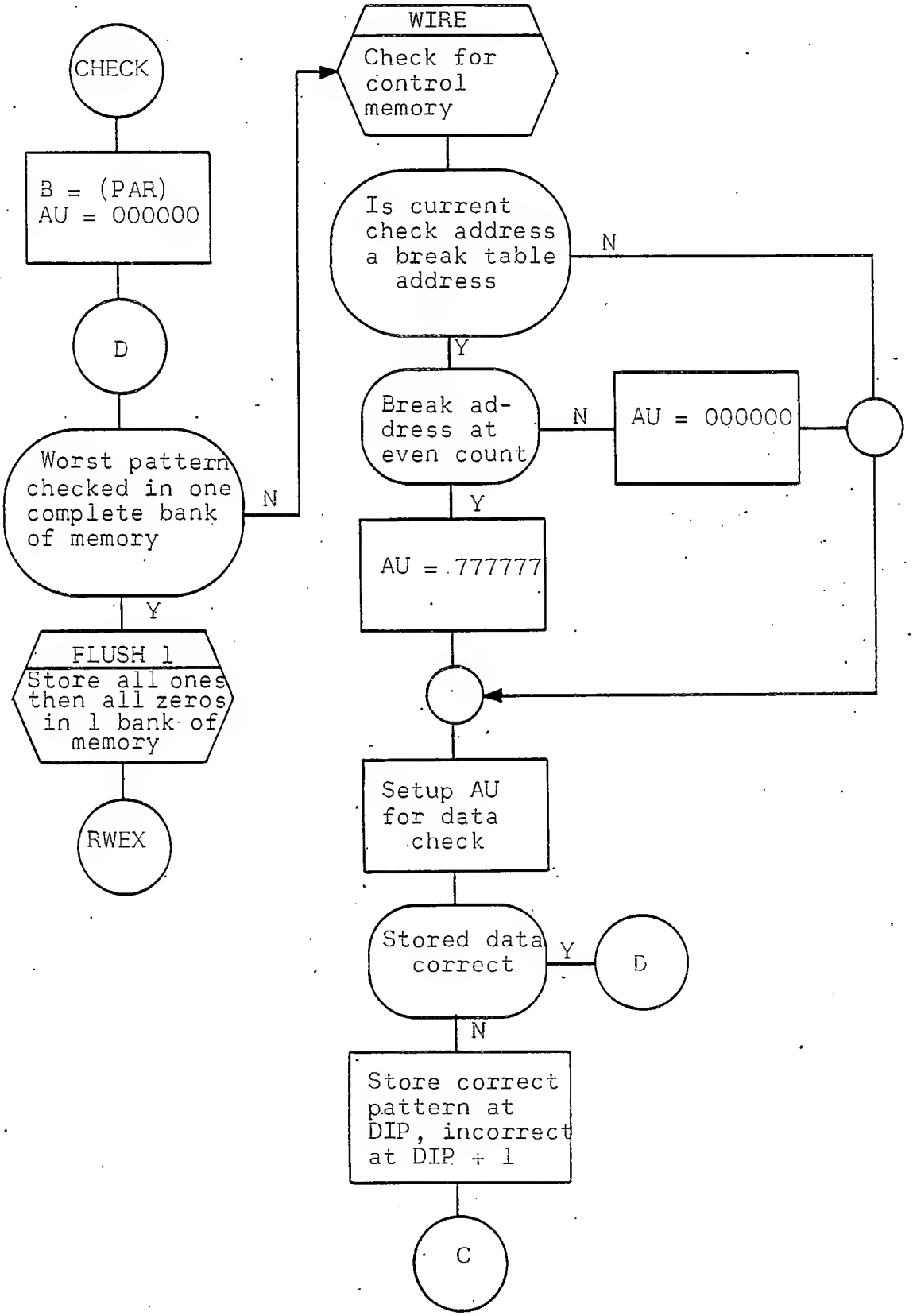
This routine, TWPO, tests the ability of the memory to accept and retain the worst pattern.

This routine is entered from routine HALTO.

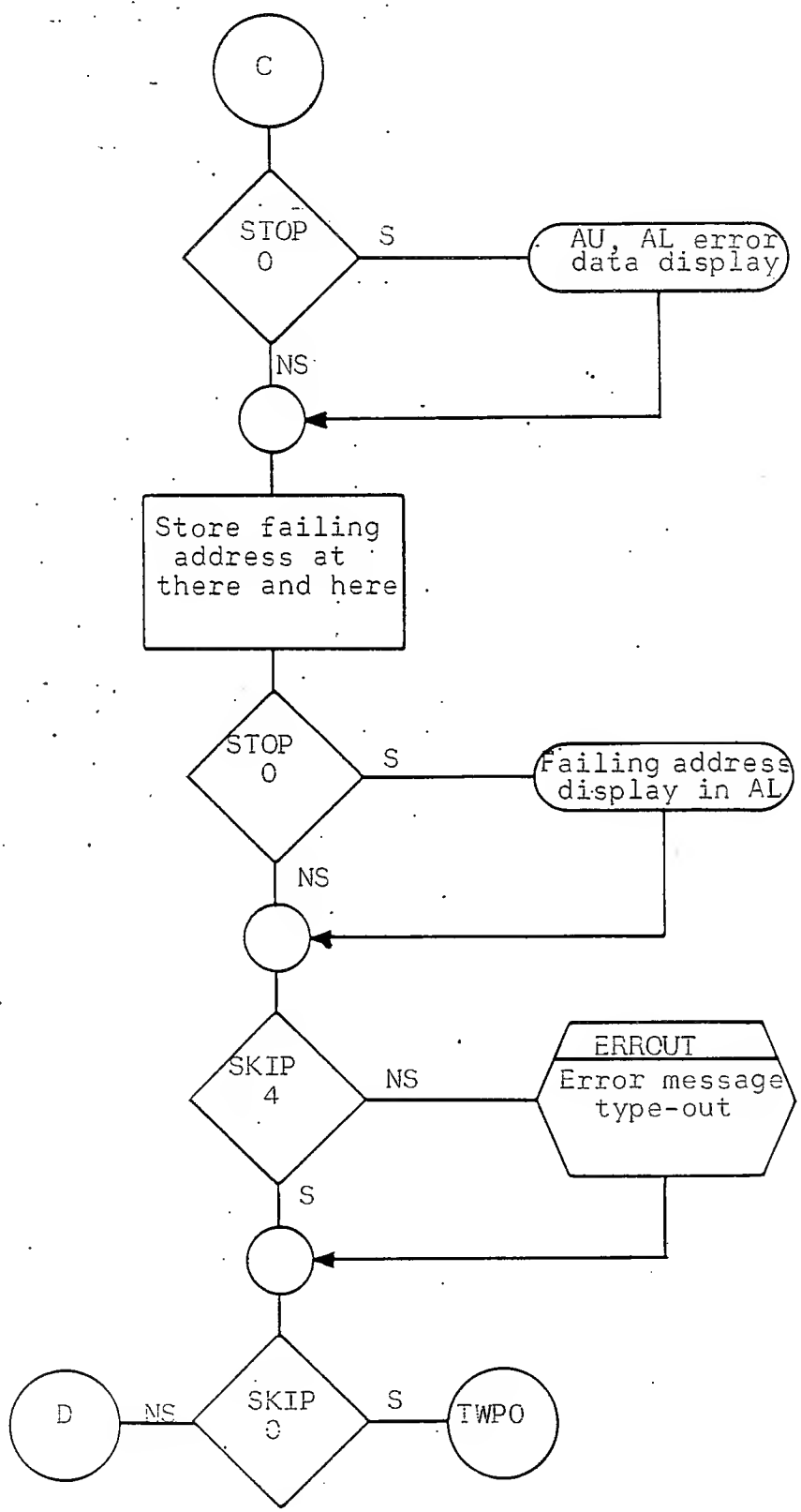
The worst pattern is a pattern that causes maximum cross-talk noise. The following arrangement produces the maximum noise. The area checked is in accordance with the parameters for the memory bank presently being tested. Upon completion of the loading, the content of each sequential address is entered into AL and checked for validity. If it is incorrect an exit is made to the error display routine ERROUT; upon completion of the subroutine, subroutine FLUSH1 is utilized to set the tested memory area to all ones then to all zeroes. Then an exit is made to the next test routine RWEX.



TYPO - WORST PATTERN



TYPO - WORST PATTERN (Cont.)



TWPO - WORST PATTERN (Cont.)

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 811 | REVISION

SPECIFICATION SYMBOL
SB-10163

TITLE: RWEX - RANDOM WORD EXECUTIVE

DECK IDENTIFIER: FACT

CS-1 LABEL: _____ KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: HWH modified by TLF DATE: 8 Dec 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 22

DESCRIPTION:

This routine, RWEX, is the random word test executive.

RWEX is entered from routine TWPO.

All necessary initialization needed in this routine, RWEX, and in the READ/WRITE test, RW, is done when this routine RWEX, is entered. Through this routine the reference addresses in the Read/Write test are updated to allow testing segments of memory by setting up the address and exiting to the Read/Write subroutine, RW. At the completion of the verify portion of the Read/Write, RW, subroutine, a return is made to this routine RWEX, to update the reference addresses to the next sequential area which is then tested. This is repeated until all of the area to be tested by this section of the memory test has been tested, then an exit is made to the next routine LAST.

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SPECIFICATION SHEET

PROGRAM DATA PAGE (Cont)

SHEET 812 REVISION A2

SPECIFICATION SYMBOL
SB-10163

TITLE: RWEX - RANDOM WORD EXECUTIVE

INPUT PARAMETERS (Listed Sequentially):

RWEX3

OUTPUT PARAMETERS (Listed Sequentially):

RW21
RW22
RW14
RW12

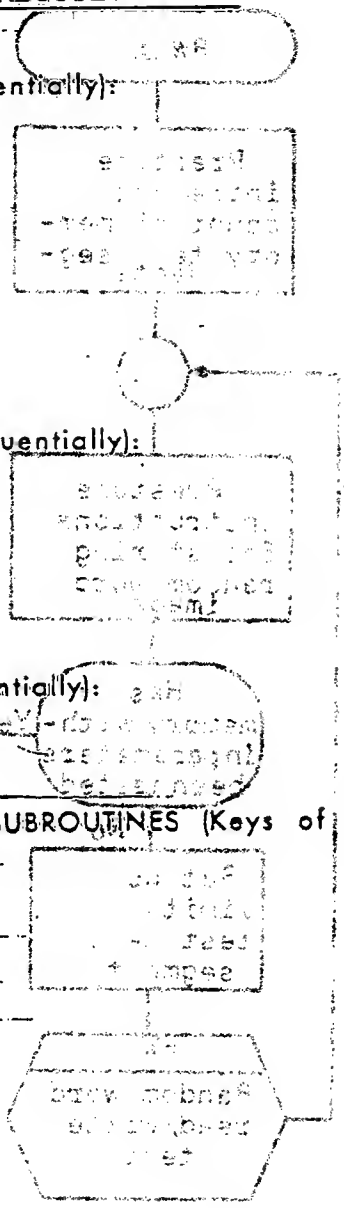
ABNORMAL EXITS (Listed Sequentially):

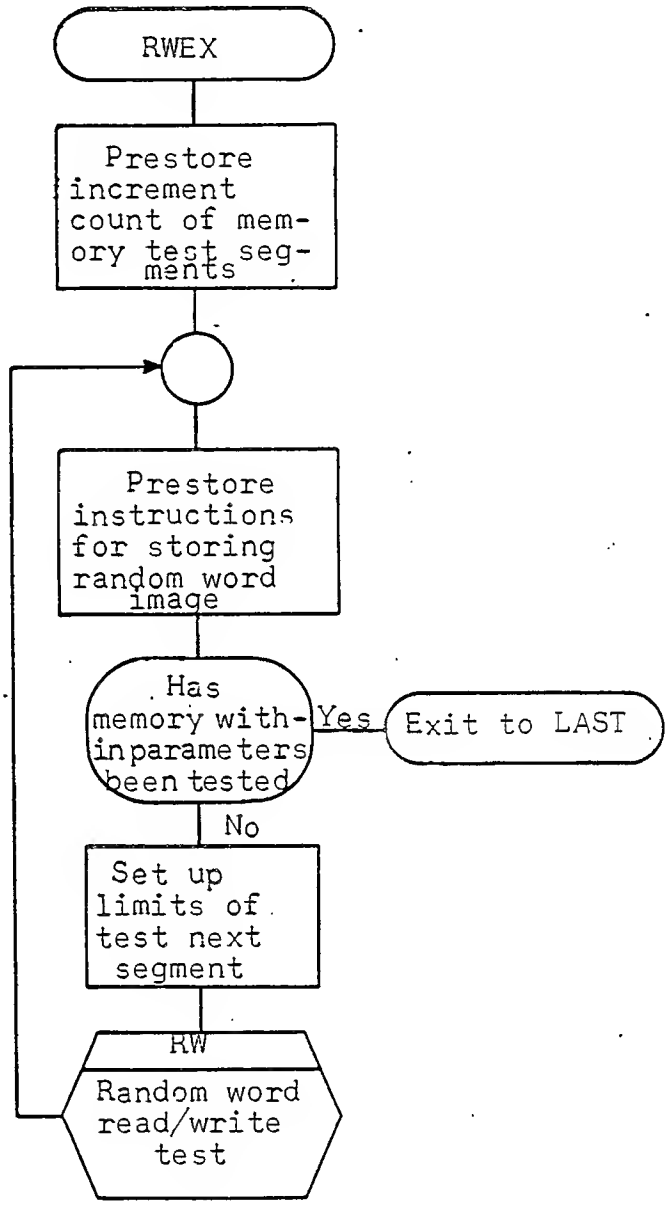
NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

RW
LAST

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:




RWEX
Prestore increment count of memory test segments
Prestore instructions for storing random word image
Has memory within parameters been tested
Yes
Exit to LAST
No
Set up limits of test next segment
RW
Random word read/write test

RWEX

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 814	REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: RW - READ/WRITE RANDOM WORD TEST

DECK IDENTIFIER: FACT

CS-1 LABEL: RW KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 Dec 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 67

DESCRIPTION:

This subroutine, RW, tests the ability of the memory to accept and retain random numbers and accomplish a fast read/write.

As a result of an entry from the Random Number Exec (RWEX) this subroutine takes numbers generated by the random-number-generator subroutine (RAN) and stores them in the addresses established by (RWEX). Simultaneously, a second store is made at another set of addresses to set up an image of the information being stored. This enables verification of the storages by comparing the two information cells at the completion of the fast read. For the fast read/write each address under test is read repeatedly 40 times. When the addresses have been read 40 times, their contents are checked for validity. If the comparison with the image addresses does not check, the incorrect information is entered into AL, the correct is entered into AU, then AU and AL are saved for the error tyepout and PROGRAM STOP 0 is checked. If PROGRAM STOP 0 is set the subroutine stops and the display may be evaluated. Upon restarting, or if PROGRAM STOP 0 is not set, the failing address is entered into AL, then AL is stored for the error typeout and PROGRAM STOP 0 is checked. If set, the subroutine stops and the operator may note the failing address. Upon restarting, or if PROGRAM STOP 0 is not set, PROGRAM SKIP 4 is checked. If not set, an error typeout will occur. After the typeout, or if PROGRAM SKIP 4 is set, PROGRAM SKIP 0 is checked. If set, RW will recycle if not set, RW will continue. After the completion of RW an exit is made to RWEX.

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SPECIFICATION SHEET

PROGRAM DATA PAGE (Cont)

SHEET 815 | REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: RW - READ/WRITE RANDOM WORD TEST

INPUT PARAMETERS (Listed Sequentially):

RW21
RW22
RW14
RW12

OUTPUT PARAMETERS (Listed Sequentially):

HERE
THERE
DIP
DIP+1

ABNORMAL EXITS (Listed Sequentially):

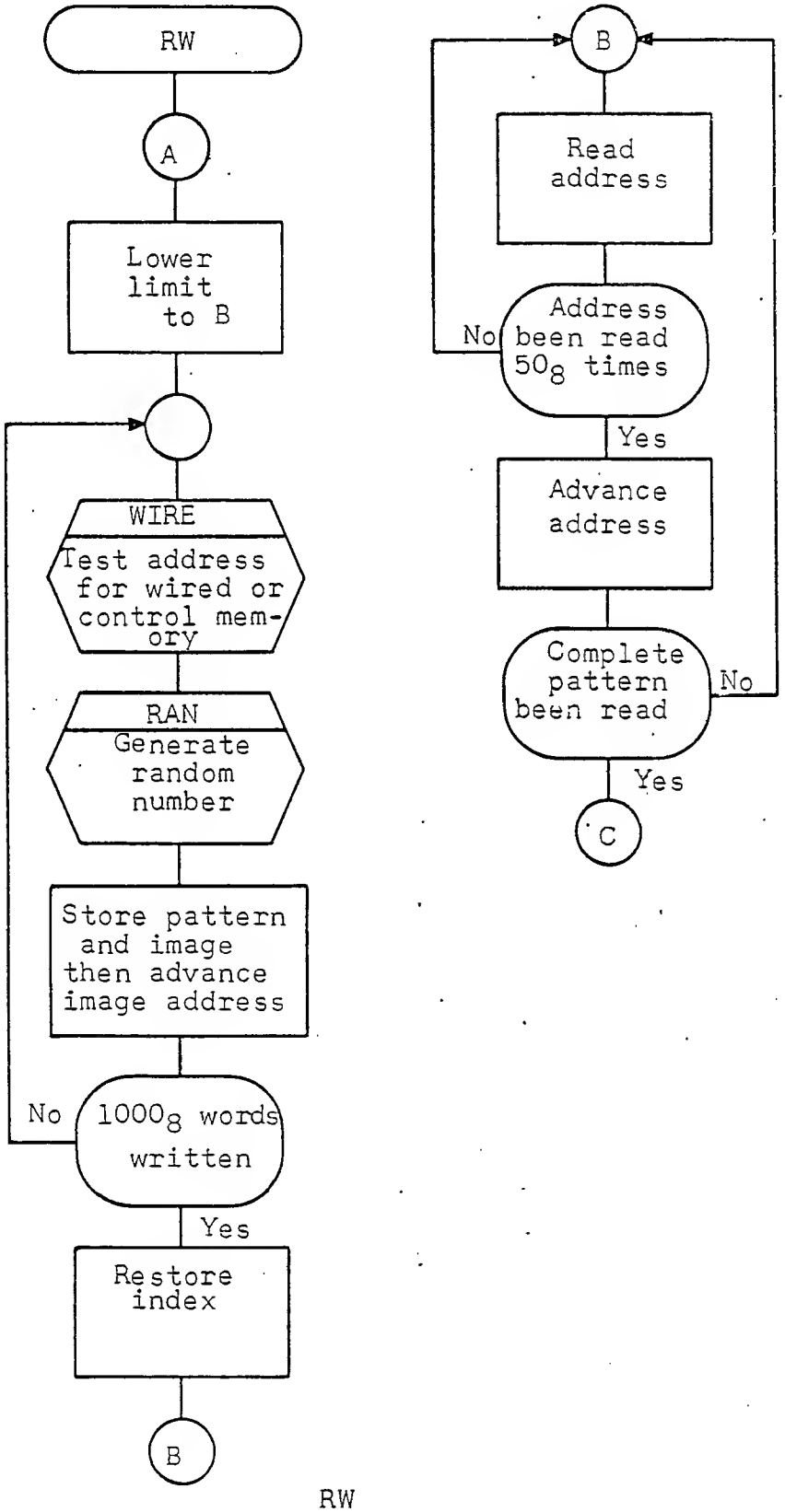
NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

RAN
WIRE
ERROUT
RWEX

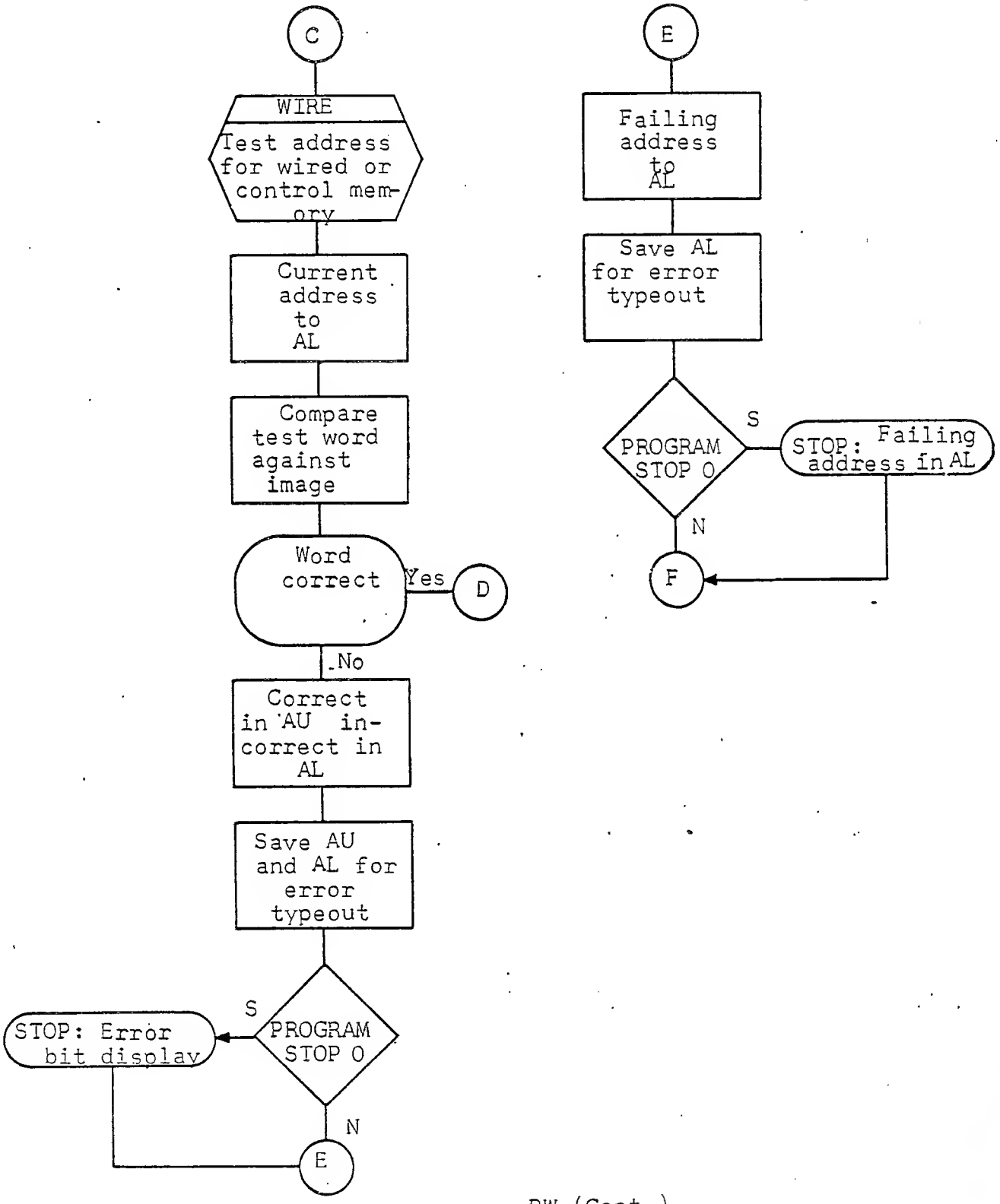
SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

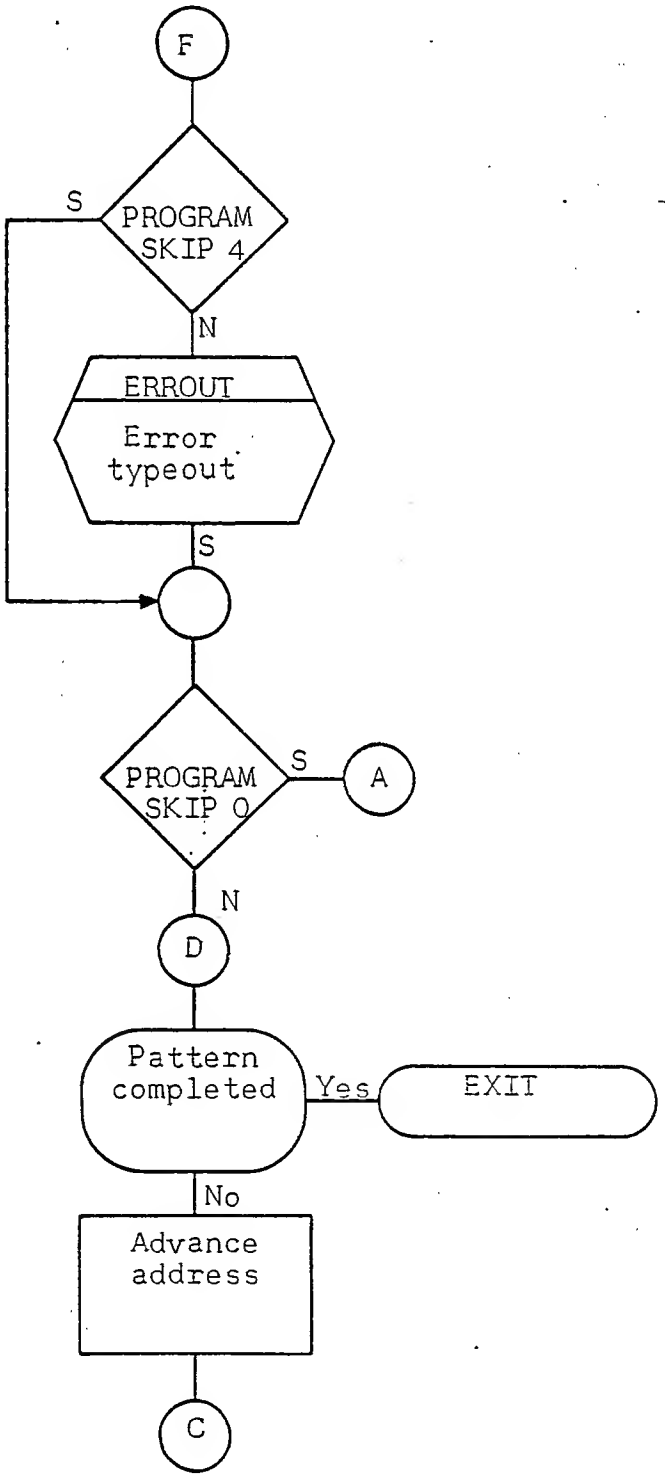
ERROR DISPLAYS
1st PROGRAM STOP 0 - correct information in AU incorrect information in AL
2nd PROGRAM STOP 0 - failing address displayed in AL
PROGRAM SKIP 4 - not set for error typeout
set to suppress error typeout
PROGRAM SKIP 0 - not set to continue subroutine RW
set to recycle subroutine


RW
A
Lower limit to B
WIRE
Test address for wired or control memory
RAN
Generate random number
Store pattern and image then advance image address
No
1000₈ words written
Yes
Restore index
B
B
Read address
No
Address been read 50₈ times
Yes
Advance address
Complete pattern been read
No
Yes
C

RW


C
WIRE
Test address for wired or control memory
Current address to AL
Compare test word against image
Word correct
Yes
D
No
Correct in AU incorrect in AL
Save AU and AL for error typeout
PROGRAM STOP 0
S
STOP: Error bit display
N
E
E
Failing address to AL
Save AL for error typeout
PROGRAM STOP 0
S
STOP: Failing address in AL
N
F

RW (Cont.)


F
PROGRAM SKIP 4
S
N
ERROUT
Error typeout
S
PROGRAM SKIP 0
S
A
N
D
Pattern completed
Yes
EXIT
No
Advance address
C

RW (Cont.)

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 819 | REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: RAN - RANDOM NUMBER GENERATOR

DECK IDENTIFIER: FACT

CS-1 LABEL: RAN KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 11

DESCRIPTION:

This subroutine generates a series of random numbers which are used by the read/write test, RW. Two basic constants are used: 000703 (RAN2) and 377775 (RAN3). RAN2 is entered into AL and multiplied by itself. At the completion of the multiply, the contents of A is divided by RAN3 (377775) and AU is checked. If AU is not equal to zero the contents of AU is stored at RAN2. If AU is equal to zero the contents of AL is stored at RAN2, thereby setting a new constant for the next generation of a random number. An exit is then made to the referencing subroutine, RW.

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SPECIFICATION SHEET

PROGRAM DATA PAGE (Cont)

SHEET 820 REVISION

SPECIFICATION SYMBOL SB-10163

TITLE: RAN - RANDOM NUMBER GENERATOR

INPUT PARAMETERS (Listed Sequentially):

OUTPUT PARAMETERS (Listed Sequentially):

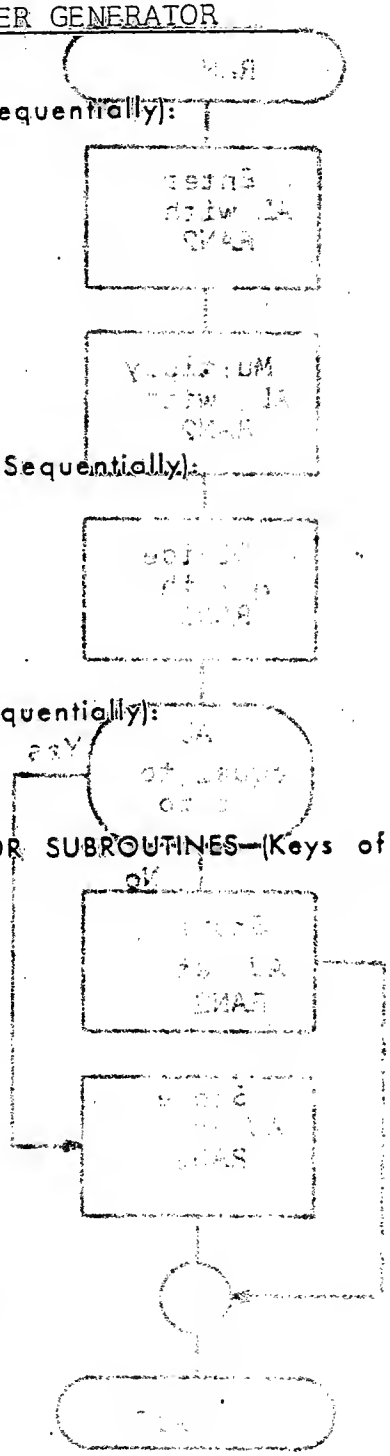
ABNORMAL EXITS (Listed Sequentially):

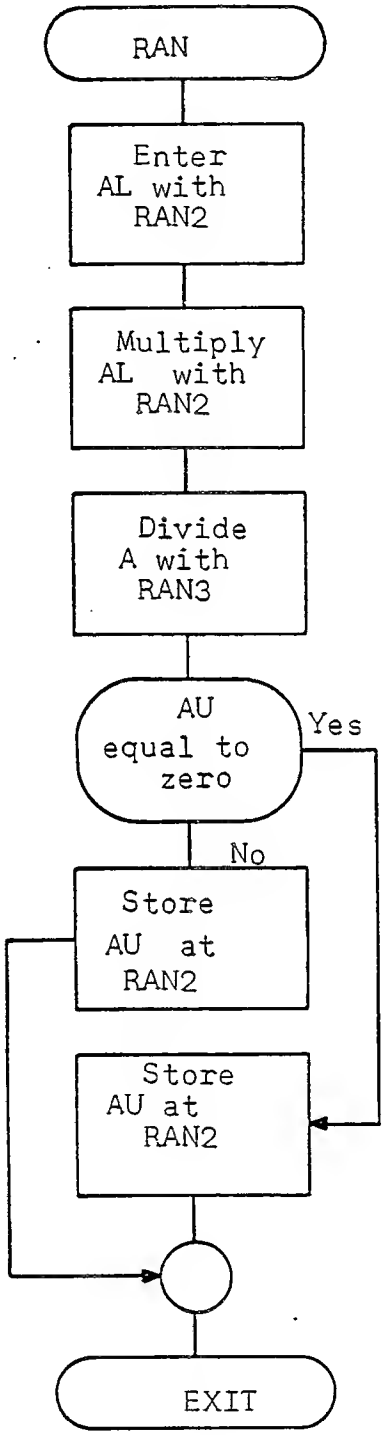
NEXT LEVEL PROCEDURES OR SUBROUTINES—(Keys of Duplicate Labels Specified):

RW

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:





RAN - Random Number Generator

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 821.1 | REVISION 1

SPECIFICATION SYMBOL
SB-10163

LABEL: LAST

TITLE AND/OR PURPOSE: LAST, the addressing structure test checks each cell for the ability to receive and hold a unique value.

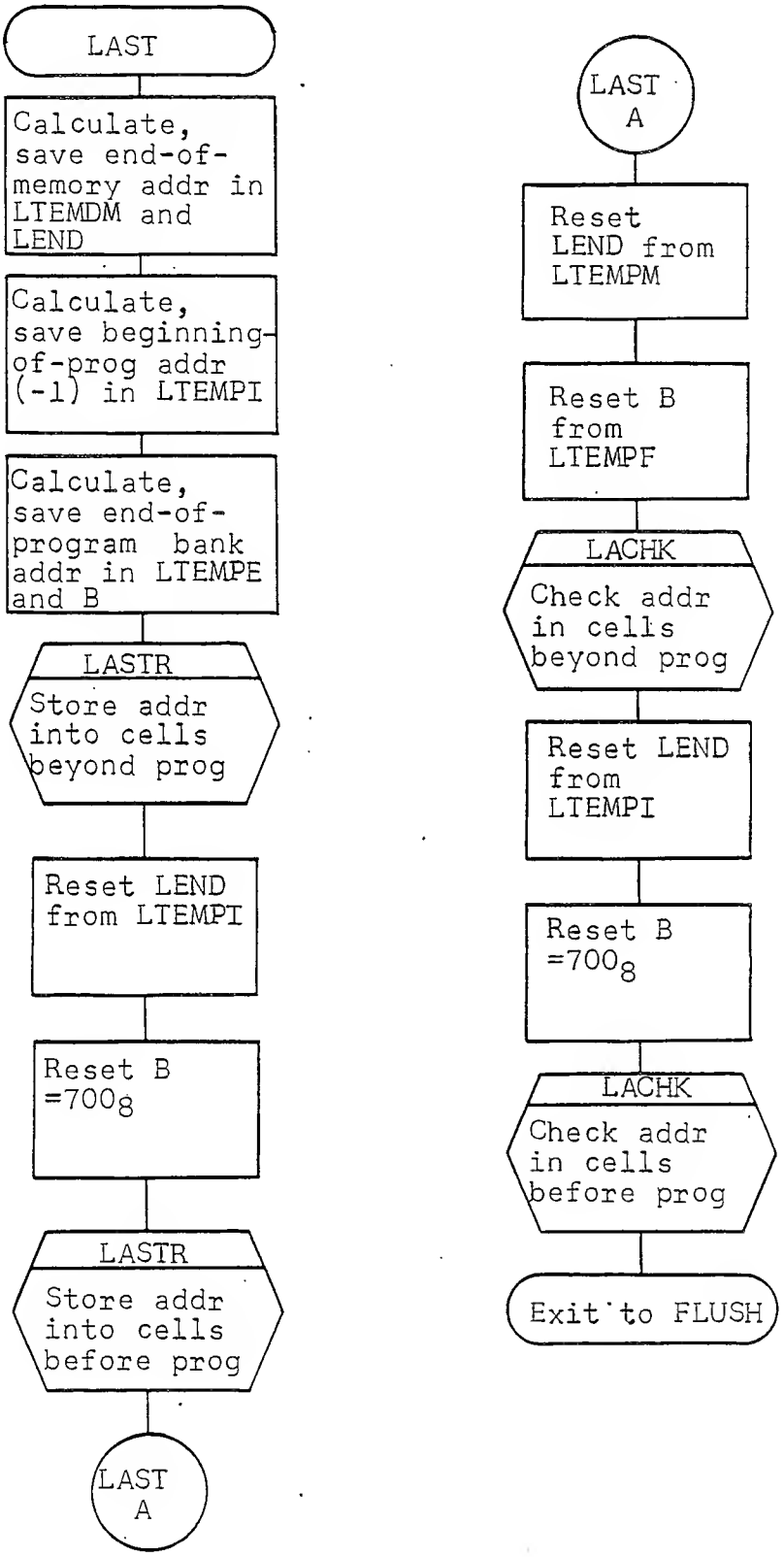
INPUT PARAMETERS:
None

OUTPUT PARAMETERS:
None

DESCRIPTION:

Beginning with the last cell of the bank where the program is currently stored, all cells are loaded with their own address. Then, beginning with address 700, all cells to the beginning of the program (-1) are also loaded with their own address.

These cells are then checked to see if their values are correct, with an error message occuring if an error is found. At the end of the checks, an exit is made to routine FLUSH.


LAST
Calculate, save end-of-memory addr in LTEMDM and LEND
Calculate, save beginning-of-prog addr (-1) in LTEMPI
Calculate, save end-of-program bank addr in LTEMPE and B
LASTR
Store addr into cells beyond prog
Reset LEND from LTEMPI
Reset B =700₈
LASTR
Store addr into cells before prog
LAST A
LAST A
Reset LEND from LTEMPM
Reset B from LTEMPF
LACHK
Check addr in cells beyond prog
Reset LEND from LTEMPI
Reset B =700₈
LACHK
Check addr in cells before prog
Exit to FLUSH

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SPECIFICATION SHEET

PROGRAM DATA PAGE

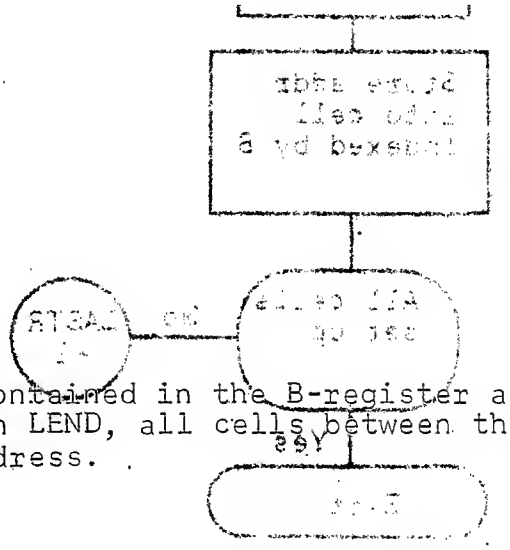
SHEET 821.3 | REVISION 1

SPECIFICATION SYMBOL
SB-10163

LABEL: LASTR

TITLE AND/OR PURPOSE: LASTR loads a cell's address into the cell. The loading operation is performed for all cells within pre-defined limits.

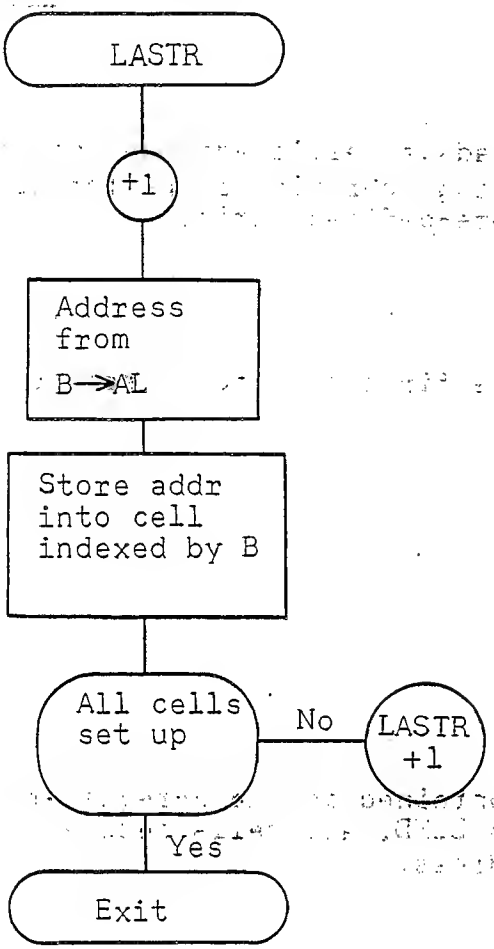
INPUT PARAMETERS:
B is set to the address of the first cell to be set up.



OUTPUT PARAMETERS:

None

DESCRIPTION:
Beginning with the address contained in the B-register and ending with the address contained in LEND, all cells between these limits are loaded with their own address.


LASTR
+1
Address from B→AL
Store addr into cell indexed by B
All cells set up
No
LASTR +1
Yes
Exit

PROGRAM DATA PAGE

LABEL: LACHK

TITLE AND/OR PURPOSE: LACHK checks a cell to determine if it contains its own address. The checking is performed for all cells within pre-defined limits.

INPUT PARAMETERS:

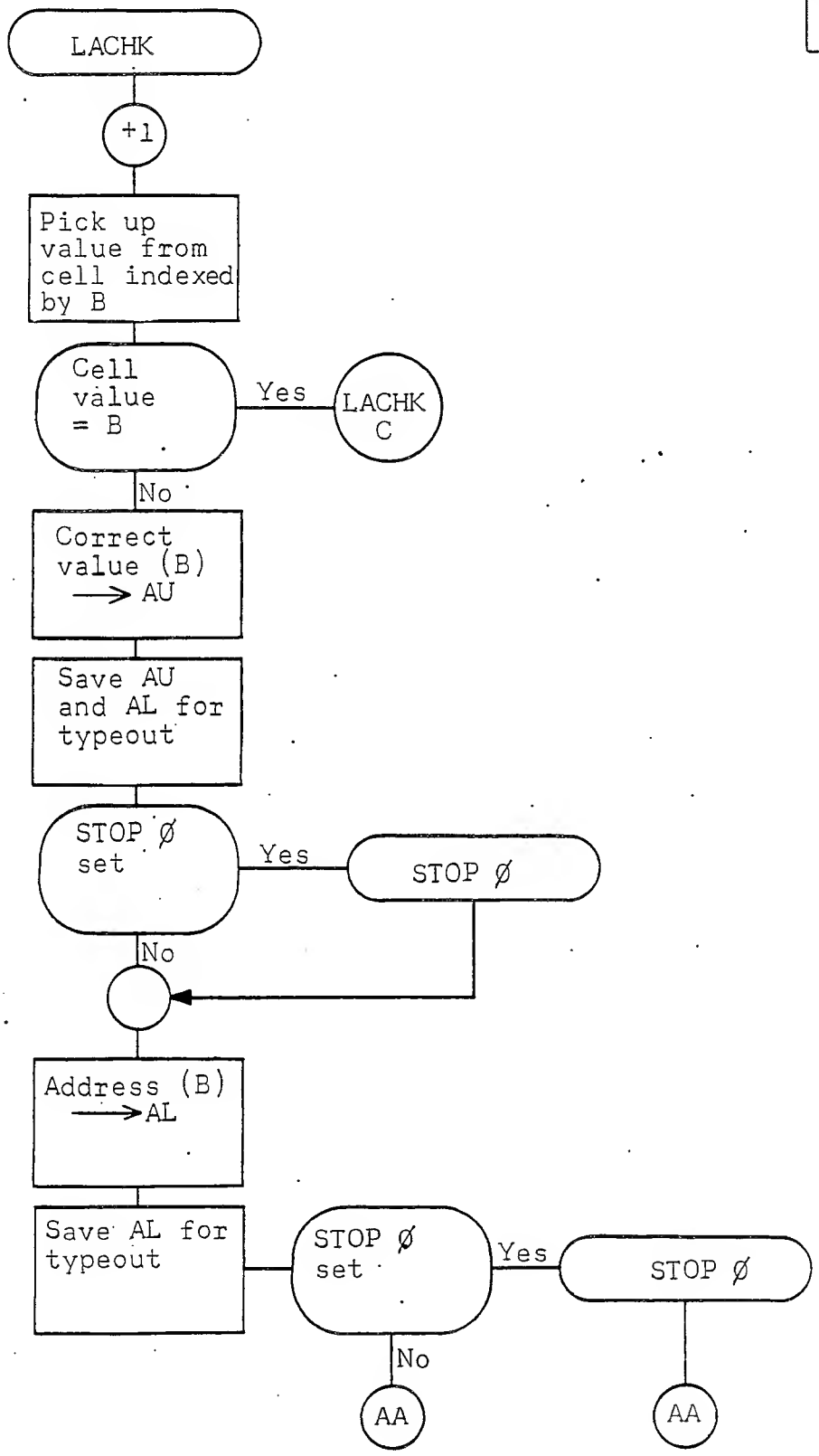
B is set to the address of the first cell to be checked.

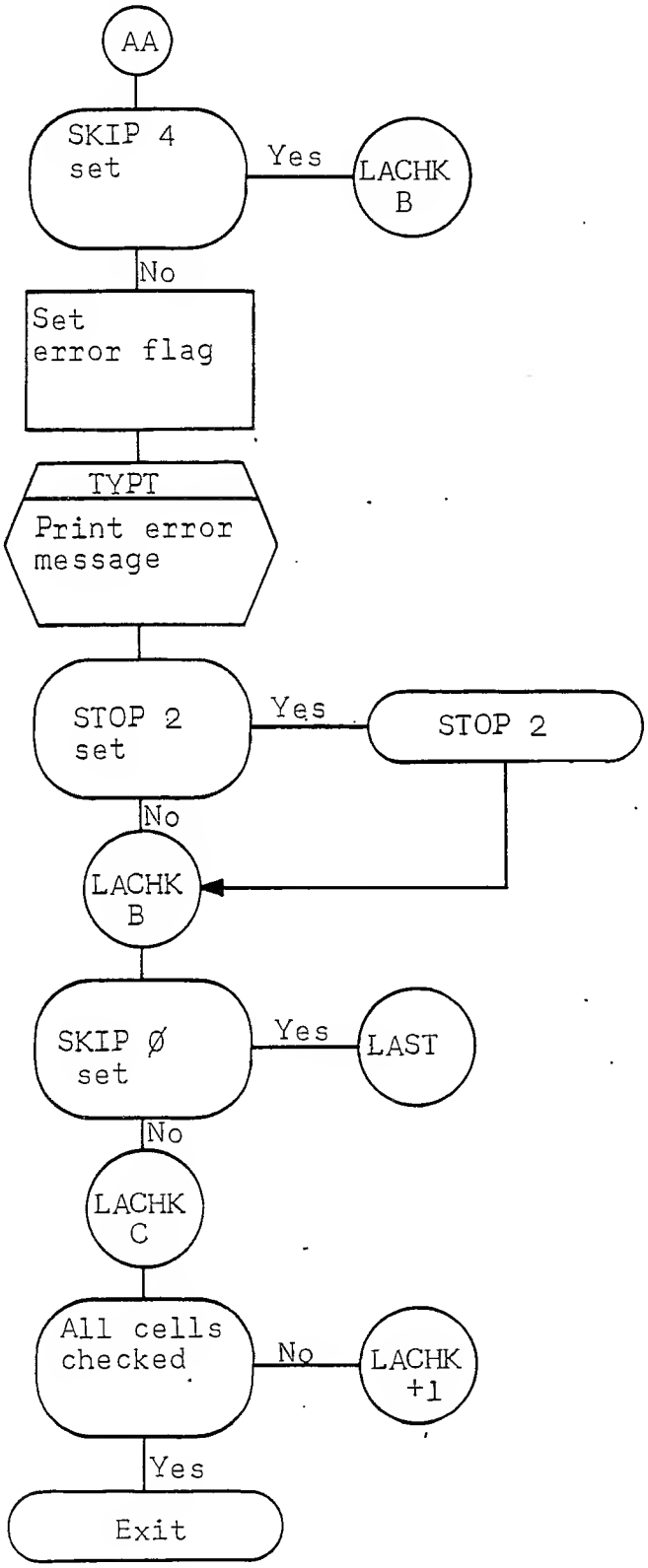
OUTPUT PARAMETERS:

None

DESCRIPTION:

Beginning with the address contained in the B-register and ending with the address contained in LEND, all cells are checked for storage of their own address. If an error is found, a message is printed (unless SKIP 4 is set).


LACHK
+1
Pick up value from cell indexed by B
Cell value = B
Yes
LACHK C
No
Correct value (B) → AU
Save AU and AL for typeout
STOP Ø set
Yes
STOP Ø
No
Address (B) → AL
Save AL for typeout
STOP Ø set
Yes
STOP Ø
No
AA
AA


AA
SKIP 4 set
Yes
LACHK B
No
Set error flag
TYPT
Print error message
STOP 2 set
Yes
STOP 2
No
LACHK B
SKIP Ø set
Yes
LAST
No
LACHK C
All cells checked
No
LACHK +1
Yes
Exit

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 822	REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: FLUSH - FLUSH MEMORY

DECK IDENTIFIER: FACT-

CS-1 LABEL: FLUSH KEY: IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 Dec 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 2

DESCRIPTION:

This routine results in the setting to all ones and then the clearing of the memory region tested in routine RWEX. Subroutine FLUSH1 is referenced and then an exit is made to routine RELO.

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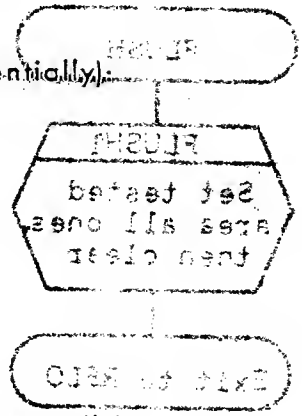
SPECIFICATION SHEET

PROGRAM DATA PAGE (Cont)

SHEET 823 REVISION

SPECIFICATION SYMBOL SB-10163

TITLE: FLUSH - FLUSH MEMORY



INPUT PARAMETERS (Listed Sequentially):

OUTPUT PARAMETERS (Listed Sequentially):

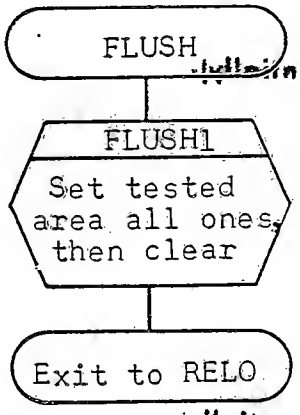
ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

FLUSH1
RELO

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:


FLUSH
FLUSH1
Set tested area all ones, then clear
Exit to RELO

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PROGRAM DATA PAGE

SPECIFICATION SHEET

SHEET 825	REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: FLUSH1- FLUSH MEMORY

DECK IDENTIFIER: FACT

CS-1 LABEL: FLUSH1 KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 16

DESCRIPTION:

This subroutine, FLUSH1, normalizes the section of memory which has been tested by the memory test.

This subroutine is referenced by routines WP1, CWP1 and FLUSH.

According to the parameters of the present section of the memory test all cells are first set to all ones (777777) then all cells are cleared to zero (000000). An exit is then made to the referencing routine.

TITLE: FLUSH1 - FLUSH MEMORY

INPUT PARAMETERS (Listed Sequentially):

TEST PATTERNS
TRAIL 777777

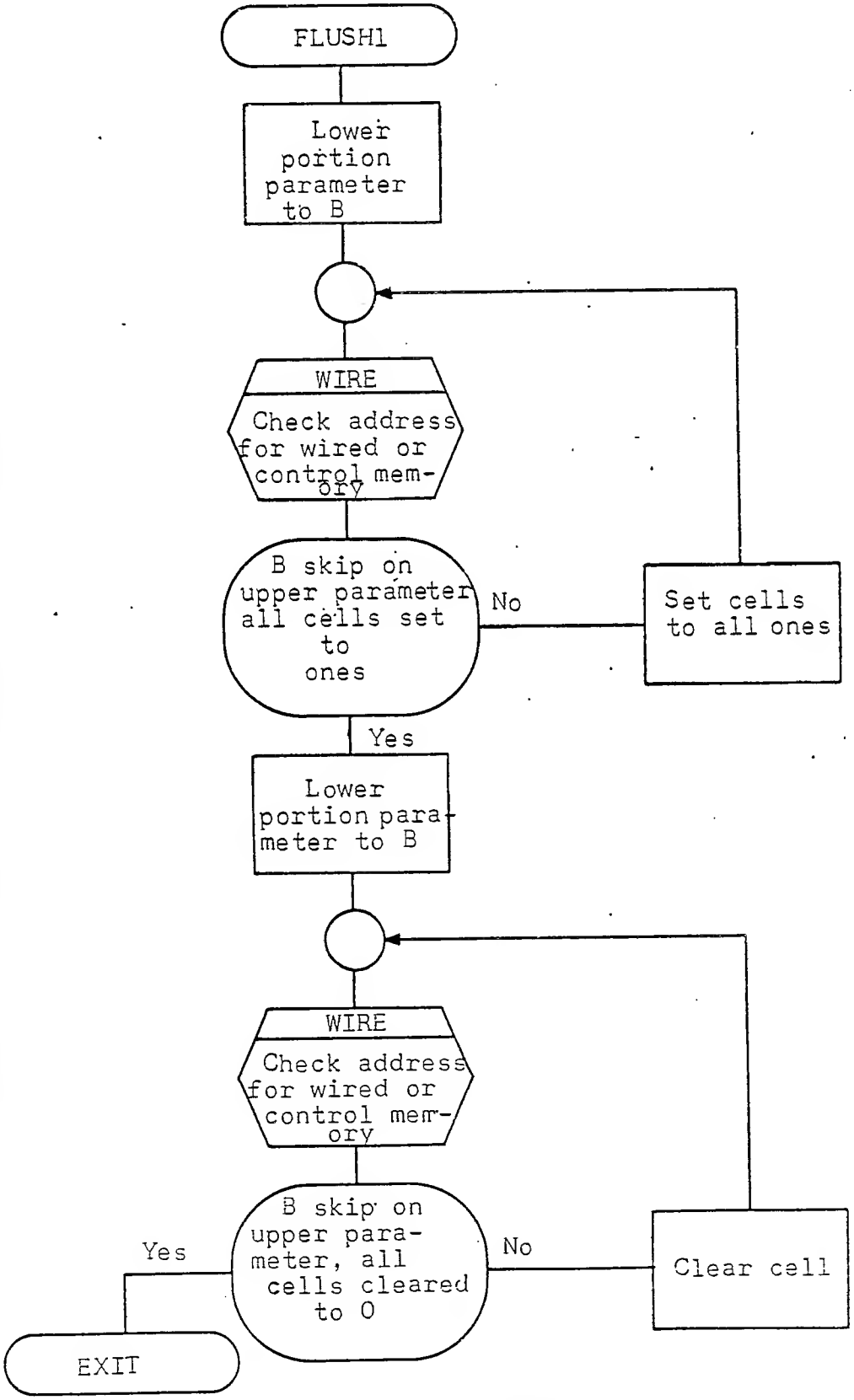
OUTPUT PARAMETERS (Listed Sequentially):

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
WIRE

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:


FLUSH1
Lower portion parameter to B
WIRE
Check address for wired or control mem-ory
B skip on upper parameter all cells set to ones
No
Set cells to all ones
Yes
Lower portion para-meter to B
WIRE
Check address for wired or control mem-ory
B skip on upper para-meter, all cells cleared to 0
Yes
No
Clear cell
EXIT

FLUSH1

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 828 | REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: RSET - TRANSFER ROUTINE

DECK IDENTIFIER: FACT

CS-1 LABEL: RSET KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 Dec 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 98

DESCRIPTION:

This routine, RSET, transfers the memory test to the next memory bank, then enters this transferred memory test and tests the next memory bank.

RSET is entered from RELO if in RELO, PROGRAM SKIP 1 is not set.

The memory test is run by loading the test in bank zero and then testing bank one. Then the program is transferred to bank one and the next appropriate bank is tested. If the memory test is in the last memory bank, bank zero is tested. The the memory test is transferred to bank zero and the cycle repeats. When RSET is entered a check is made to determine if the last memory bank was just tested. If it was the program is transferred to the last bank and bank zero is tested. If the last bank was not just tested a check is made to determine if the memory test program is in the last bank. If it is the program is transferred to bank zero and bank one is tested. If neither of the above checks are positive the program is transferred to the next bank and the next bank+1 is tested. After each transfer by this routine an exit is made to the transferred memory test program.

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SPECIFICATION SHEET

PROGRAM DATA PAGE (Cont)

SHEET 829 | REVISION

SPECIFICATION SYMBOL
SB-10163

TITLE: RSET - TRANSFER ROUTINE

INPUT PARAMETERS (Listed Sequentially):
BLMN

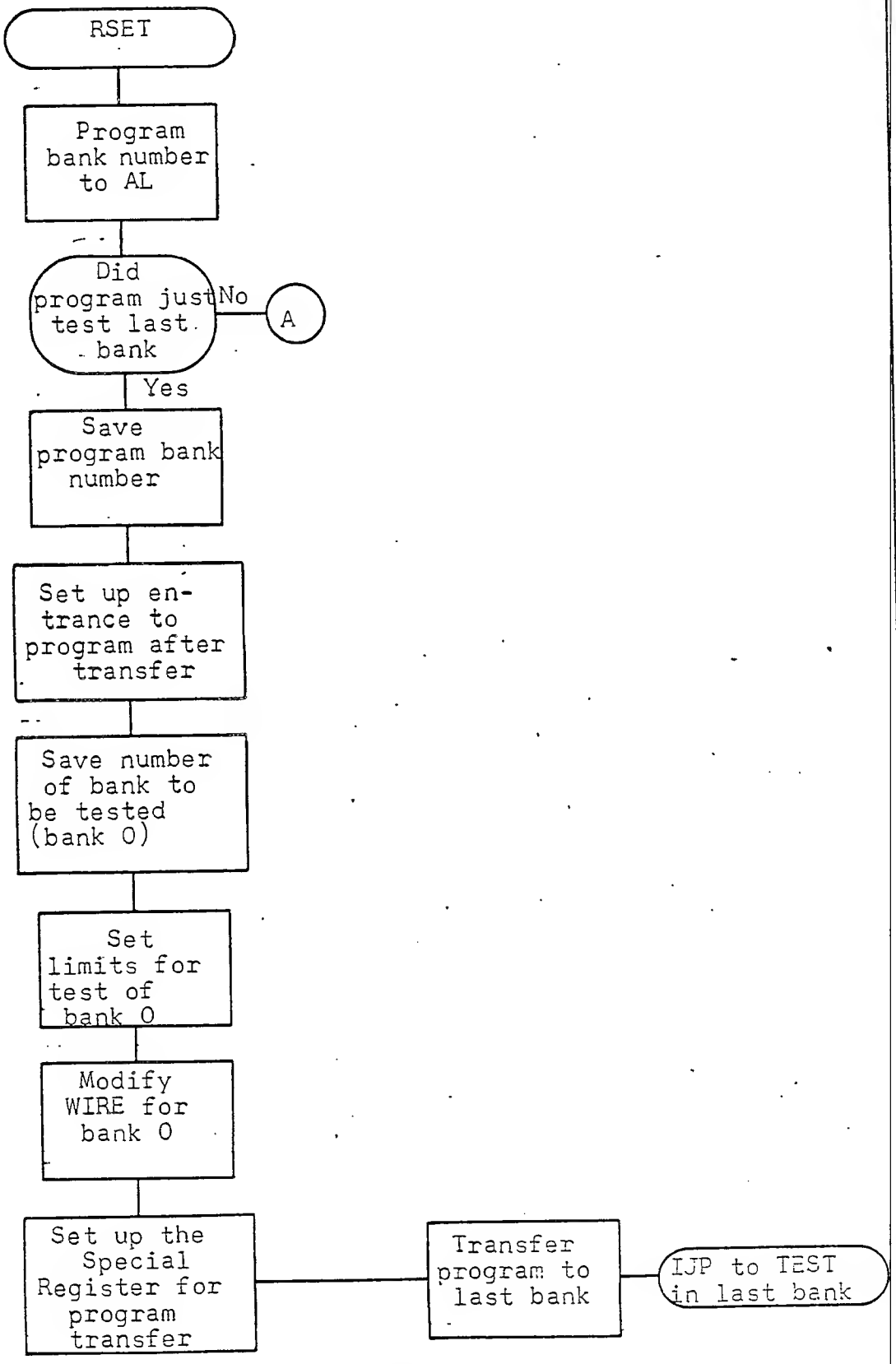
OUTPUT PARAMETERS (Listed Sequentially):
WIRE 1

ABNORMAL EXITS (Listed Sequentially):

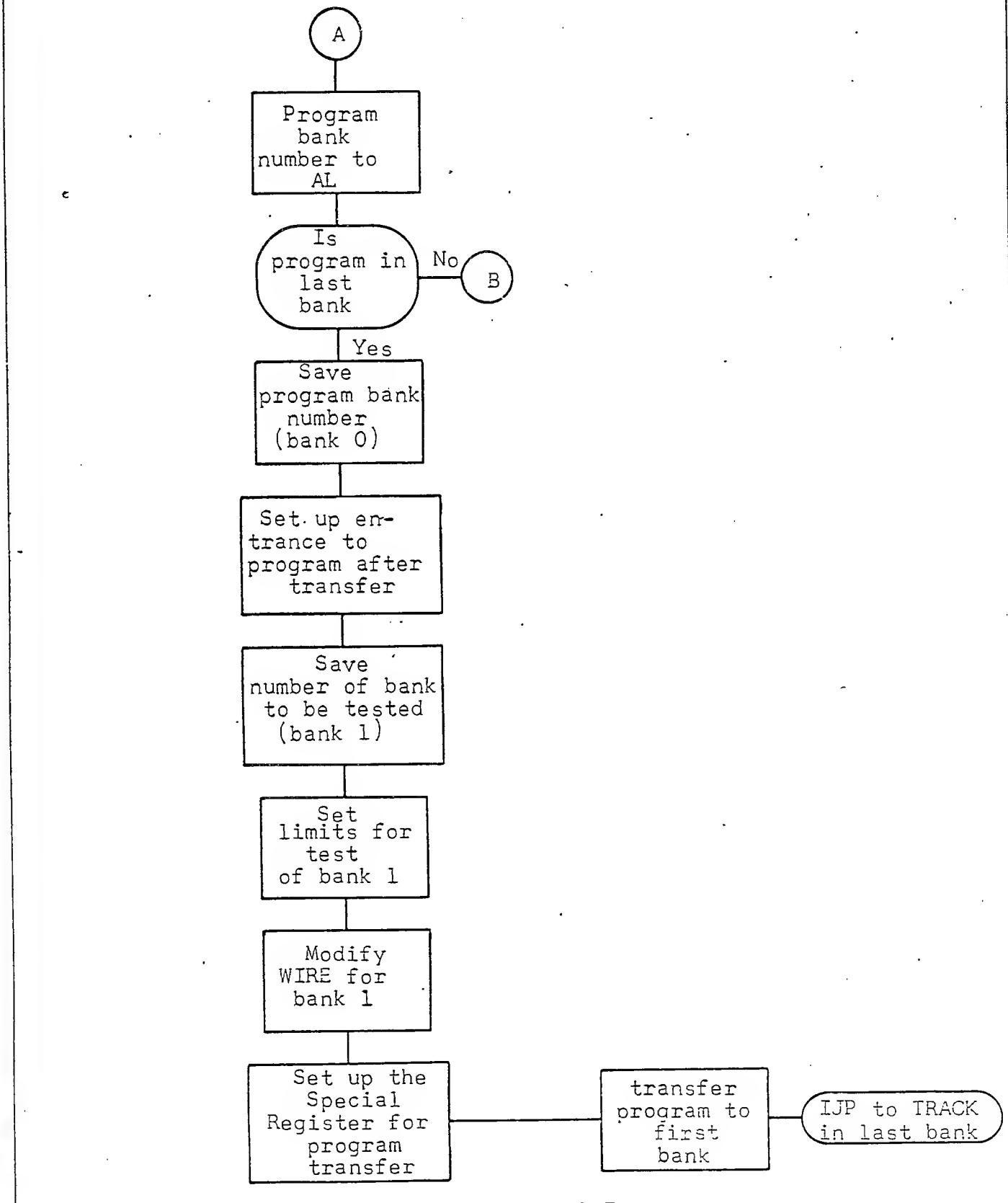
NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
TEST
TRACK in CRANK

SYSTEM DATA REFERENCES:
TOTAL

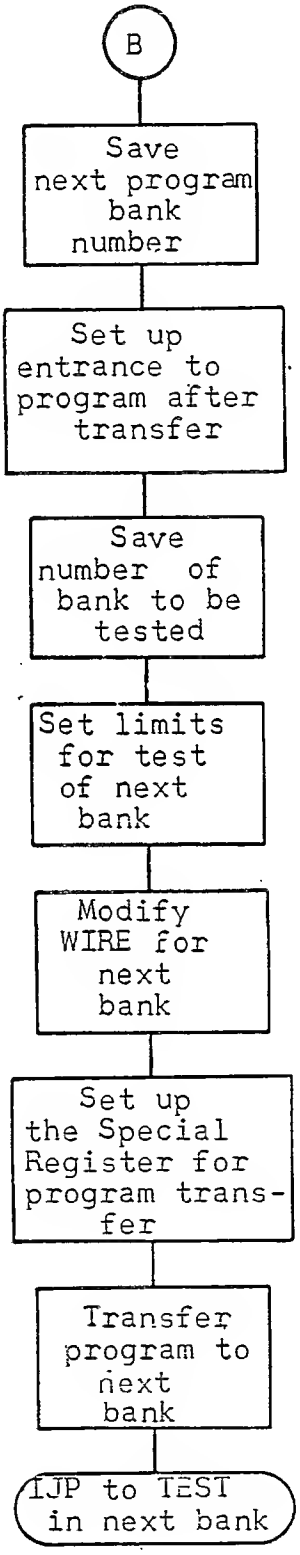
ALARMS AND/OR REMARKS:


RSET
Program bank number to AL
Did program just test last bank
No
A
Yes
Save program bank number
Set up entrance to program after transfer
Save number of bank to be tested (bank 0)
Set limits for test of bank 0
Modify WIRE for bank 0
Set up the Special Register for program transfer
Transfer program to last bank
IJP to TEST in last bank

RSET


A
Program bank number to AL
Is program in last bank
No
B
Yes
Save program bank number (bank 0)
Set up entrance to program after transfer
Save number of bank to be tested (bank 1)
Set limits for test of bank 1
Modify WIRE for bank 1
Set up the Special Register for program transfer
transfer program to first bank
IJP to TRACK in last bank

RSET


B
Save next program bank number
Set up entrance to program after transfer
Save number of bank to be tested
Set limits for test of next bank
Modify WIRE for next bank
Set up the Special Register for program transfer
Transfer program to next bank
IJP to TEST in next bank

RSET

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 833	REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: RELO - RELOCATION

DECK IDENTIFIER: FACT

CS-1 LABEL: RELO KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 Dec 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 27

DESCRIPTION:

This routine is part of the memory test control and contains constants and storage for the memory test.

This routine is referenced by routine FLUSH after the memory test has been completed in the present bank and the tested memory has been normalized.

PROGRAM STOP 1 is checked upon entering RELO. If set, the program stops, terminating the memory test. If PROGRAM STOP 1 is not set, or upon restarting, PROGRAM SKIP 1 is checked. If set the memory test will recycle in the present memory bank. If not set, an exit is made to routine REST to transfer the memory test and test the next memory bank. This routine adjusts the buffer limits for error typeouts to the values needed in the next bank. Also, the BCW's for TYPT and TYPC are adjusted to the new bank.

SPECIFICATION SYMBOL
SB-10163

TITLE: RELO - RELO

INPUT PARAMETERS (Listed Sequentially):

OUTPUT PARAMETERS (Listed Sequentially):

TYPAJ + 10
TYPAJ + 11

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

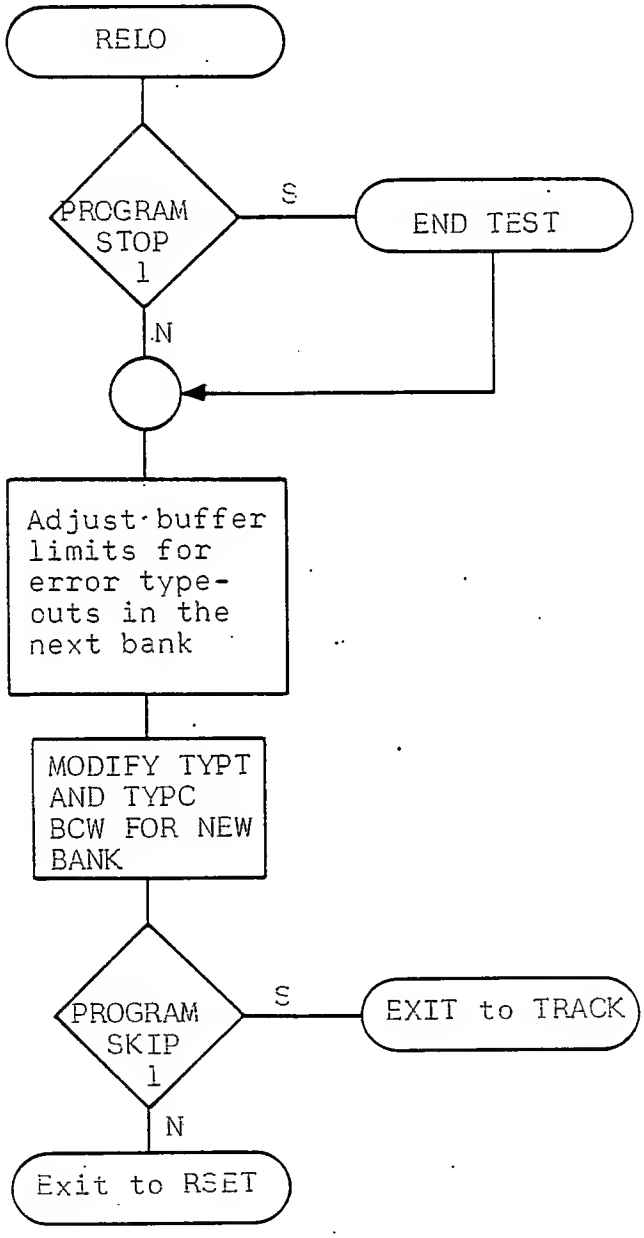
TRACK
RSET

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

PROGRAM STOP 1 -set for end of memory test

PROGRAM SKIP 1 -Set, recycle the memory test and retest the present bank.
Not set, exit to RSET to transfer program and test next memory bank.


RELO
PROGRAM STOP 1
S
END TEST
N
Adjust buffer limits for error type-outs in the next bank
MODIFY TYPT AND TYPC BCW FOR NEW BANK
PROGRAM SKIP 1
S
EXIT to TRACK
N
Exit to RSET

RELO